SCOTTISH JOURNAL
OF
POLITICAL ECONOMY

FEBRUARY 1958

PLURALISM, POLITICS AND SOCIOLOGY*

POLITICAL philosophy is in a bad way. It may be that the pace and scale of events are too much for it. Faced with Hiroshima and with Belsen, Mr. Laslett suggests,[1] a man is unlikely to address himself to a neat and original theory of political obligation. In fact many who, in other times, would have attempted to think about social and political matters in the manner of Plato and Hobbes and Rousseau have instead turned to demonstrate by linguistic analysis that the questions traditionally discussed by political theorists are meaningless. A parallel scientific positivism inspires the attempt to take over the territory of political theory for breaking up into strictly empirical sociological lots. But no one is very happy about these substitutions. The academic sociologists, Mr. Laslett observes,[2] alternate between an attitude which proclaims that political philosophy is impossible and an urgent pleading for a new political philosophy which will give them guidance and make sense of their conclusions. The new logicians are not so ambivalent. But the ever-changing perspective of linguistic analysis is widening to include the possibility that the propositions typical of traditional moral and political theory are not so much meaningless as badly worded ; the emphasis now is on reformulation rather than outright dismissal.[3] In due course, as the dust stirred up by the 'revolution in philosophy' continues to settle, it may be more widely recognised that there are no substitutes for political theory. Some one must try to make sense of the developing situation as a whole ;

* This article is based in part on a paper read to Glasgow University Philosophical Society.

[1] Peter Laslett (ed.), *Philosophy, Politics and Society* (1956), p. vii.

[2] Ibid., p. viii. The non-academic or Marxian sociologists have no second thoughts. For them all political theories of the traditional type are merely ideological reflections of class interests.

[3] A good account of the changing attitude to value-statements among disciples of Wittgenstein is given by John Holloway in *The New Outline of Modern Knowledge* (ed. Pryce-Jones, 1956), Section on Analytical Philosophy.

some one must try to get some consistency into the process of formulating standards of evaluation of social and political institutions and conduct; and it is desirable—to quote the only value-judgment common to the analysts and their adversaries—that if there is thinking to be done it should be done clearly.[4]

The thesis of this paper is that any attempt to revive or strengthen the tradition of political theory, and to consider its relations with the newer empirical sociological disciplines, should take it up at the point reached by the pluralist thinkers of the generation before last. 'Political pluralism', considered as a systematic theory of politics, came to grief early. But its leading ideas are still very much alive. Political commentators, trying to single out the major world-political tendencies of to-day, contrast the 'pluralist' and the 'totalitarian' conceptions of social organisation. The more general thinkers who have managed in the face of the anti-philosophical spirit of the age to write political theory in something like the grand manner are precisely those who, like Lindsay and Barker, have subjected the theory of the state to a criticism inspired by pluralist ideas. The pluralist critique has also decisively influenced the course of sociological inquiry. It is clearly perceptible in Durkheim. It determined Hobhouse and MacIver to go over from political theory to sociology. It may yet serve to provide the newer schools of group sociologists with the general theoretical guidance they need to make sense of their conclusions.

Pluralism is essentially a restatement of the tradition of British Individualism. The permanently valuable element in Individualism, expressed in different ways by Locke, Bentham, and Mill, is its assertion that there are limits to the authority and power of the state, and that these limits are set by the nature of men-in-society. But the Individualists defined men-in-society, inadequately, as an aggregate of individuals. They would probably have agreed, if pressed, that these individuals were organised and associated not only for political purposes in the state, but for all manner of other purposes in a diversity of other groupings. But their political theory ignored this diversity. In their eagerness to establish that the state was an artificial creation, they simplified the problem by declaring that only the individual was natural. If they had admitted that family, neighbourhood, work-group, and church were natural social formations, this might have opened the door to the obnoxious idea that the state too was a genuine development of the social nature of the individual.

[4] This value-judgment is seldom or never explicitly stated by analysts. It is, I think, implied by such statements as: 'the function of the philosopher is to clarify . . .'

The weakness of the Individualists is that their theory failed to describe the facts of social life in mid-century Britain. On their principles the state should have left to individual effort the provision of whatever social protection might be required against dirt, disease, and poverty. But the developing industrial and urban civilisation of nineteenth-century Britain threw up problems of public health and under-employment which could be met only by positive state action. The new liberal collectivism which began to characterise British social policy from 1850 onwards needed a new political theory. And as it happened the ideas which were put forward more than justified the worst fears of the Individualists.

These ideas, deriving from Plato, Aristotle, and Hegel, translated into modern industrial-social terms the famous saying that 'Man is by his nature (i.e. at his best) a member of a city-state'. But the upholders of the 'Philosophical Theory of the State', as it came to be called, drew a false analogy between the Greek city-state and the contemporary nation-state.[5] T. H. Green,[6] F. H. Bradley and Bernard Bosanquet (in ascending order of certainty) are the chief exponents of this analogy. Ignoring the difference in complexity, they thought of the modern state as being simply the city-state writ large. Since the Greek *polis* was co-extensive with the entire complex of social relationships, these thinkers thought of the modern state as in principle similarly all-embracing and all-pervading. But this is an obvious straining of the English language. The term 'state' in English usage refers only to the political and legal and administrative organisation of society. Bosanquet got out of the language difficulty by using the word in two senses, narrower and broader. The state in its narrower sense is the state of ordinary usage, the political fabric. The state in its broader sense includes 'the entire hierarchy of institutions by which life is determined, from the family to the trade, and from the trade to the Church and the University'.

Let us nickname the two the state-proper and the state-grandiose. Bosanquet on the state-proper talks sense. It is 'the hinderer of hindrances to the good life'. It cannot over-rule the moral freedom of the individual, nor can it take over the tasks of the more intimate social groups or of the great non-political associations. But his thinking is confused throughout by the implication that the state-proper is connected with and exalted by the state-grandiose. He tends by this confusion to provide some pseudo-justification for the near-totalitarian

[5] See A. D. Lindsay in Marvin (ed.), *Recent Developments in European Thought* (1920), p. 170.

[6] T. H. Green is to be included in this triumvirate only with major reservations. He is nearer to Lindsay than to Bosanquet.

tendencies which are visible in some areas of Western politics and public administration to-day. This is not a major criticism of Bosanquet. As Lindsay shows, the main aim of Bosanquet is to demonstrate what the state-proper can and cannot do. But his failure to distinguish clearly between state and society (the whole complex of non-political groupings) is more than a verbal confusion. It is a confounding of two distinct things.

The essential merit of the pluralist critique is that it re-establishes the distinction, and with it the limits set on state action by the nature of men-in-society, by giving a more adequate account of the facts denoted by the term ' society '.

There are of course many varieties of pluralist thinking. There are the extreme pluralists, who interpret the word to mean the exact contradictory of monist: to mean, that is to say, that there is no unifying principle holding society together. On this view society is simply a contingent anarchy, a permanent battle-field, a huddle of groups jostling and struggling together and maintaining a rough and ready equilibrium in the struggle: while the state, which claims in principle to keep order in an impartial way, is in fact usually the instrument of a particular powerful group, like big business. The early Laski often talks like this. But the more moderate pluralists do not deny that society is a unity in diversity. They emphasise the diversity, but they also emphasise that it does hold together. They are not group anarchists: they do not wish to destroy the state-principle. Cole, for example, sought to replace the state as we know it, the ' political state ', by a more genuinely representative governing body elected by people organised according to occupational and religious and other functions and interests: this would have been an alternative and (as Cole held) a more effective expression of social unity.

The more extreme pluralists have merged without trace into those schools of realist political scientists who think exclusively in terms of power-and-pressure-groups. The more moderate but still extensive pluralist constructions, which sought to remake society, fell still-born from the press. What remains is the vital pluralist critique with its effects in every field of social and political thought. The common element in all pluralist thinking is the desire to correct the abstractions of classical political and legal theory, which dealt with an abstract state over against an abstract individual, by comparing these abstractions with the facts of social life.

The best statements of this central thesis are those of Frederick William Maitland and John Neville Figgis. Maitland is a jurist. In

his Sidgwick lecture on 'Moral Personality and Legal Personality'[7] he is concerned to criticise the then dominant legal-political doctrine, derived from Roman Law, which holds that all groups are legally speaking fictitious persons, creatures of the state. He does so by drawing attention to the fact of Corporateness in the Modern State. He quotes Professor Dicey's words : 'When a body of men bind themselves to act together in a particular way for some common purpose, they create a body which, by no fiction of law, but by the very nature of things, differs from the individuals of whom it is constituted.' With this he goes on to criticise the doctrine of State Sovereignty. This doctrine is that the nation-state is supreme in relation to all internal groups and independent in relation to all other nation-states. Maitland revolts against this doctrine in its internal implications. The doctrine means that the purpose of the state sets it in a class by itself above all other groups, so high that in comparison with it they can be counted as mere lawyers' fictions ; leaving in the eyes of the law only the state on the one hand over against the mass of individuals who have set up and maintained the state. In technical lawyers' language this is put in the following way. The law recognises only two kinds of person (a person legally speaking is a unit with rights and duties, capable of owning property, of entering into contracts, of suing and being sued, of being held responsible for its conduct). They are : natural persons, individual human beings ; and the state. But corporations (legally recognised groups intermediate between state and individual) possess personality only by a legal fiction. Their group personality is created by the state and dependent on the state.

I quote Maitland[8]: 'This doctrine was first clearly proclaimed, so we are told, by the greatest lawyer that ever sat upon the chair of St. Peter, Pope Innocent IV. You will recall Mr. Dicey's words : " not by fiction of law, but by the very nature of things '. Invert those words and you will have a doctrine that works like leaven in the transformation of mediaeval society. . . . What was understood to be the Roman doctrine of corporations was an apt lever for those forces which were transforming the mediaeval nation into the modern state. The federalistic structure of mediaeval society is threatened. No longer can we see the body politic as *communitas communitatum*, a system of groups, each of which is in its turn a system of groups. All that stands between the state and the individual has but a derivative and precarious existence.' Maitland goes on to illustrate the possible consequences of such a doctrine from France . . . 'there, I take it we may see the

[7] Delivered in 1903 ; published in Maitland, *Selected Essays* (ed. Hazeltine, Lapsley, and Wingfield, 1936), pp. 223-239.
[8] Op. cit., pp. 228-9.

pulverizing, macadamizing tendency in all its glory, working from century to century, reducing to impotence, and then to nullity, all that intervenes between Man and State.' In fact, as he goes on to admit, the nineteenth century in France was kinder to associations than might have been expected from the Revolutionary Assembly declaration of August 18, 1792.[9] He was still apprehensive about the effects of Waldeck-Rousseau's 'law of association' in 1901, directed against the Church. Once more his fears were unfounded, as we now know. But we can point to a sharper example of what Maitland was driving at in the brief history of National Socialist Germany.[10]

However, Maitland's main point is the simple one that this doctrine is bad law. And it is bad law for a reason of peculiar interest to sociologists. It is bad law because it does not conform to social fact. 'If the law allows men to form permanently organised groups these groups will be for common opinion right and duty bearing units ; and if the law giver will not openly treat them as such, he will misrepresent them, or as the French say, he will 'denature' the facts. . . . When that happens he incurs the penalty ordained for those who ignorantly or wilfully say the thing that is not.'[11]

The same essential point is expounded by John Neville Figgis,[12] a disciple of Maitland. The real problem, he says, is the relation of smaller communities to that 'community of communities' we call the state, and whether they have an existence of their own or are the mere creatures of the sovereign. In fact the state did not create the family,

[9] 'A state that is truly free ought not to suffer within its bosom any corporation, not even such as, being dedicated to public instruction, have merited well of the country' (op. cit., pp. 229-30).

[10] 'Totalitarianism is one-sidedly conceived when it is pictured merely as an exaltation of the power of government and the extension of its regulation over the whole area of private interests and individual choice. Such an extension is effectively possible only where the spontaneous and indigenous social groupings of men in a complex society are weakened or destroyed and their place is taken by *ad hoc* organizations designed to be the agencies of regimentation. This was in fact the policy deliberately and systematically pursued by National Socialism, and it was this, far more than the absurd mythology of the racial state, which rendered the German population helpless before the combination of propaganda and terrorism by which they were effectively manipulated. . . . Autonomous and voluntary labor unions were destroyed, and the whole working population was forced into the single Labor Front, with some twenty-five million members. The family was weakened by a judicial policy that encouraged the birth of illegitimate children. The churches were interdicted from every form of activity that could be construed as interference in secular affairs. Even social intercourse was proscribed so far as possible outside the state-controlled agencies for organizing the use of leisure time. Every measure was taken that could reduce men to human atoms who, by reason of their isolation from all the channels of normal discussion and their insignificance in a socially amorphous mass, were the more amenable to hysteria and to control by the agents of the Party.' G. H. Sabine, *Philosophical Review*, Vol. LVII (1948), pp. 10-11.

[11] Op. cit., pp. 232-3.

[12] J. N. Figgis, *Churches in the Modern State* (1913).

nor did it create the churches, nor even in any real sense can it be said to have created the club or the trade unions, nor in the Middle Ages the guild or the religious order, hardly even the universities or the colleges within the universities. They have all arisen out of the natural associative instincts of mankind. In England as in Scotland it is the smaller associations which have always counted for most in the life of the individual. And yet the prevailing doctrine of state sovereignty denies these groups any real existence or independence. It holds that in every political society there must be some power entirely above the law because it can alter the law. That is the claim made in principle, but only in principle. It is admitted that ' the sovereign power though illimitable in theory is limited in practice very materially '. And Figgis concludes, in words which almost repeat Maitland: ' It would appear a more reasonable maxim to get a theory of law and government not by laying down an abstract doctrine of unity, *but by observing the facts of life as it is lived and trying to set down the actual features of civil society.*[13]

The essential contribution of pluralism to our thinking about society is in the field of political philosophy. It opens up the whole question of the purpose of society and particularly of government. A combination of legal convenience and philosophical grand strategy had produced a lop-sided theory. The state is supreme in power and authority, according to Austin (Maitland's target) because it is the source of law. The state is supreme in value, according to Bosanquet, because it is at its highest the all-inclusive principle of social life, the social fulfilment of the individual. The pluralists seek a more adequate adjustment of the relation between the state and the non-political forms of social life, the associations which are distinct and separate from the state in fact and value. Maitland and Figgis have shown that these associations have their own inherent principle of life, and that they come closer to the needs of the individual than does the state.[14] But they have a clearer grasp of the function and importance of the state than some of their fellow-pluralists. To them it is the containing vessel of community, *communitas communitatum.* It is the

[13] Op. cit., p. 87.

[14] ' What do we find in fact? ' (asks Figgis, continuing from the passage quoted in the previous paragraph). ' Not surely, a sandheap of individuals, all equal and undifferentiated, unrelated to the state, but an ascending hierarchy of groups: family, school, town, county, union, Church. All these groups; or many of them, live with a real life: they act towards one another with a unity of mind and will as though they were single persons: they all need to be allowed reasonable freedom, although they must be restrained from acts of injustice to each other or towards their individual members: they are all means by which the individual comes to himself ' (op. cit., pp. 87-8).

organ of regulation of the smaller communities. 'To prevent injustice between those groups and to secure their rights, a strong power above them is needed. It is largely to regulate such groups and to ensure that they do not outstep the bounds of justice that the coercive force of the state exists. But it does not create them, or is it in many matters in direct contact with the individual.'[15]

There is no statement of the pluralist critique which brings out the essential ground of its determination to limit the state. There is one suggestion, implicit in various remarks about Maitland, that the state, for all its contemporary importance, is a transient form of organisation compared with family or neighbourhood, or some associations which transcend national boundaries.[16] This kind of thought should be of particular interest to sociologists, one of whose tasks is to identify the permanent or universal forms of human association. It has, however, been suggested hitherto in this context by historians. A. L. Smith quotes Raymond de Saleilles on Maitland: 'Europe in the Middle Ages was one vast community of legal forms. . . . It will have to become this again under pressure of economic necessities and other modern agencies of civilisation. . . . Of that great day Maitland will have been one of the pioneers.' And A. L. Smith goes on: 'No one can study mediaeval history in its bearing on the modern world without this conviction of some future reunion of Europe forcing itself upon him—a reunion made possible by the decline of the doctrine that the nation-state is supreme in relation to all internal groups and independent in relation to all other nation-states—the doctrine of state-sovereignty.'[17] There is implicit here a ground for the distinction between state and society, through which the pluralist conviction of the prior value of society might be supported by a demonstration of the greater permanence of society, as compared with state.

It remains to sum up the two characteristic assertions of pluralism. The first is that the state is vested with special power and importance because of its function. The second is that the state is nevertheless an instrument, a means to an end.

The power and importance of the state derive from its special and unique function of maintaining law and order and sustaining public services over the entire territory of the political society. It is the organised expression of the will of all individuals and groups in society that they should hold together. It includes everybody, whereas all other associations are partial and selective. It is given the monopoly

[15] Op. cit., p. 90.
[16] e.g. the Roman Catholic Church.
[17] A. L. Smith, *Frederic William Maitland* (1908), pp. 53-4.

of organised force. It has behind it the habitual support of the vast majority of the people at any given time. It promotes the health and well-being of its members by measures which remove or mitigate the evils of bad housing, unhealthy working conditions, malnutrition, prolonged unemployment, and extreme poverty.

So far the pluralists are on common ground with the state-centred theorists. Their distinguishing mark is in their insistence that the state is not therefore the single and dominant and all-inclusive principle of social organisation. The same people as are associated in the state are also associated in a multitude of other groupings. Some of these are natural, like the family, others religious, like the church, others economic and occupational—business and industrial undertakings, trade unions, professional associations—others voluntary, like the Pigeon Club or the Amateur Drama League or the Esperanto Society. The state is the framework within which these bodies operate. But it is a means to an end, and the end is the life of society as manifested in the non-political groups. For the pluralist (A. D. Lindsay says: 'For the democrat') politics and government are a secondary matter, a necessary but strictly instrumental arrangement. And this entails the organisational principle of a plurality of systems of social control, a many-centred as contrasted with a monolithic social organisation. Parents, not state crèches, should have the responsibility for bringing up young children; school masters and professors, not administrators, should prescribe what and how schools and universities should teach; trade unions should be free to negotiate wages with their private and public employers, and so on. This is the distinguishing feature of the 'open society'. It permits and fosters, to quote Professor Sabine, a variety of autonomous or semi-autonomous groupings in which individuals engage in activities that they feel to be interesting and significant, in which they are subjected to the discipline and training that membership in such groups entails, and in which, so to speak, the group itself creates its own authority and enforces its own standards.[18]

The main justification of such a society is that it maximises personal freedom. It is true that families, trade unions, churches, professional groupings, habitually exercise a deeper and more pervasive influence on the lives of their members than legal authority commonly attempts, and that the abuse of this power may lead to a more damaging kind of enslavement than was ever imposed by any political tyranny prior to 1933. But in the ordinary course of things the regulation exercised by

[18] G. H. Sabine, op. cit., p. 11.

the non-political groupings does not *feel* coercive.[19] These operate largely as face-to-face groupings—families, congregations, trade unions, work groups, college common-rooms. The members have a common store of non-verbal understandings and forms of communication which give depth and reality to their overt discussions.[20] They have a sense of sharing in the working out of a course of action and way of living which they understand and want to pursue. This for the ordinary man is effective freedom. For the extraordinary man, the rebel, the isolated and original thinker, the plural society provides living- and thinking-space in the interstices of its open group structure.[21]

Such freedom is good in itself, without reference to consequences. It is also good for society, since it ensures a flexible social organisation. Elton Mayo makes this claim in the course of a panegyric of 'English-speaking democracy'. All other forms of government, he affirms, from imperial Rome to the debased Fascism of Mussolini, can be represented in an engineering blue-print—authority concentrated at the top, lesser authorities functioning down the scale only by permission or by a delegation of authority from the top. In the democracies there is no such concentration of authority. In a national emergency —depression, war, pestilence, flood, famine—the central authority must assume arbitrary and absolute power. But when the emergency passes the central control is relaxed and the 'locus of decision' moves from centre to periphery as circumstances may require.[22] This distribution of decision-resources is the key to the ability of the democracies to ride the storms of this troubled century. No centralised system of social control can cope with the sheer burden and variety of the decisions forced upon contemporary political societies. In a world changing so quickly and on such a massive scale the best and most viable pattern of organisation is one which fosters responsibility and initiative in every group and stratum of the population, the pattern of the open, adaptive, multi-group society.

The function of political theorists, says Margaret Macdonald, is to emphasise at a critical moment a criterion which is tending to be overlooked or denied.[23] The main value of the pluralist concept is that it illuminates the real points of conflict between and within the major contemporary political societies. It no longer makes sense to describe that conflict in Marxian-economic terms. The central fact in

[19] Ibid.
[20] Cf. Laslett, op. cit., pp. 157-9.
[21] Sabine. op. cit., p. 13.
[22] Elton Mayo, *Social Problems of an Industrial Civilisation* (1949), pp. xiv-xv.
[23] In A. G. N. Flew (ed.), *Logic and Language* (1951), p. 186.

'capitalist' and 'socialist' countries alike is the struggle between the totalitarian or power-centred and the pluralist or power-distributed concepts of organisation. And for these concepts, and particularly for the distinguishing differentia of totalitarianism, we are indebted to Maitland.[24]

The outcome of the struggle, the question whether the pluralist pattern is likely to gain ground in the future by virtue of its superior powers of adaptivity (as Elton Mayo suggests) is harder to resolve. Certainly the 'trend towards mass civilisation', which E. H. Carr held some years ago to be the inevitable movement of things,[25] is visibly losing momentum. The Russian masses, and *a fortiori* the populations of the Soviet satellite states, are becoming less and not more amenable to manipulation from above. The essentially pluralistic lineaments of the American people are beginning to show again through the cloud of mass hysteria exploited by the late Senator McCarthy.[26] Observers of the workings of the British political system, with all its enormous post-1945 expansion of governmental functions and powers, are constrained to describe it in terms of an 'implicit pluralism'. But these observations are general and impressionistic, lacking in precision, difficult to validate. Something more specific is needed.

One such more specific indication of the increasing relevance of the stream of pluralist ideas to the understanding of modern society is 'the recent shift in sociology, and in the affiliated field of social psychology . . . evidenced in the rapidly mounting interest in the study of the small group.'[27] This development, it should be emphasised, has no explicit connection with pluralism. It has arisen quite independently from a variety of sources: the sociological implications of Freudian theory, the experimental group dynamics of Kurt Lewin, the sociometry of Moreno and, notably, the practical difficulties of industrial and other bureaucracies, which 'have unexpectedly rediscovered the importance of the small groups which typically form, often not according to plan, at many places in these large social organisations'.[28]

The pluralist way of looking at things, although derived from a different field of observation, offers a conceptual framework within

[24] See p. 5 above.

[25] 'The trend towards mass civilization seems irresistible and irreversible; the alternatives are to accept it or to let contemporary civilization perish altogether.' E. H. Carr, *The Soviet Impact on the Western World* (1946), p. 103.

[26] Cf. E. Shils, *Torment of Secrecy* (1957).

[27] R. K. Merton: Introduction to G. C. Homans, *The Human Group* (1951), p. xvii. See also Raymond Aron, *German Sociology* (1957), p. 124. '. . . it is the empirical investigation of small groups, and especially sociometry, which seems likely to influence the development of general sociology . . .'

[28] R. K. Merton, op. cit., p. xviii.

which these group phenomena acquire meaning. It suggests that the new development in sociology should be regarded as complementing and correcting the massive generalisations advanced by an earlier generation. Such major figures of the pre-1914 era as Weber and Tönnies detected in modern industrial society a general and irreversible tendency towards increasing scale of operation, increasing rationalisation, increasing bureaucracy. 'Max Weber' (writes Raymond Aron) 'a nationalist and far-sighted German, lived in the years before the first world war as a prophet of misfortune, announcing the catastrophe which he felt to be imminent. But he is not only to be understood in terms of his attitude to his own country : he was not only a German, but also a man of the twentieth century combining foresight and courage. He lived intensely our own destiny, fearful that the individual might be swallowed up by a bureaucratic apparatus, that liberty might disappear in a rational economic system, and the human person in a mass society.'[29]

Weber saw the drive towards a functionally rational society as a threat to the personal autonomy of the individual, rendering him progressively less capable of thinking for himself and of striking his own course in life. The newer emphasis on first-hand sociological observation draws attention, quite in the manner of Maitland and Figgis, to pervasive and recurring facts of social life which modify and resist the pulverising tendency of large-scale organisation. The micro-sociologists, as Raymond Aron calls them, are concerned with different facts, or rather the same facts at an earlier stage of development : not the permanently organised groups which Maitland forced upon the attention of jurists—corporations, quasi-corporations, voluntary associations, trusts—but the primitive working of the natural associative instincts of mankind in fields beyond the limits or below the level of juristic apprehension. But they are making for the same result, pursuing the same line of advance.[30] They are demonstrating the strength and resilience of the social forces which work *within* large-scale territorial and functional undertakings to preserve the

[29] Aron, op. cit., p. 106.

[30] 'The march of the progressive societies was, as we all know, from status to contract. And now? And now that forlorn old title is wont to introduce us to ever new species and new genera of persons, to vivacious controversy, to teeming life ; and there are many to tell us that the line of advance is no longer from status to contract, but through contract to something that contract cannot explain, and for which our best, if an inadequate, name is the personality of the organised group.' Maitland, op. cit., p. 233.

For a discussion of this use of the concept of 'group-personality' see J. A. Mack, 'Group Personality—A Footnote to Maitland', *Philosophical Quarterly*, Vol. 2, No. 8, July 1952, pp. 249-252.

substantial rationality of persons[31] against the demoralising and depersonalising influences which Weber feared and warned against.

For Weber himself the human situation is essentially a tragic one : its focus is the struggle of the individual to maintain personal autonomy by the practical non-rational affirmation of supreme values as personal imperatives against the blind determinism of the external world and in the face of conflicts of irreconcilable realms of law ; he ' does not believe that a political or social movement would suffice to transform our enslavement into liberty '.[32] Probably he had Marxism in mind. The sociologist of to-day, looking more closely at the facts of large-scale organisation, detects a persistent counter-tendency towards the formation of groups which assert a partial autonomy of action and decision, which set and enforce their own standards of conduct, and which bring about considerable modifications in the policy and conduct of the undertaking, the more considerable because (usually) unrecognised. The classical study of the Bank Wiring Observation Room in the Hawthorne works of the Western Electric Company[33] is a case in point. It gives a detailed account of the ways in which small groups of workers spontaneously and undeliberately create their own defences against forces which Weber thought to be irreversible within the context of industrial society. And it is only one of a large and increasing number of examples, over a wide range of social life, of effective small-scale resistance to large-scale functional-rational planning.

It must be said that some leading figures in contemporary sociology are looking in a different direction for a conceptual framework within which to fit their observations. Representative figures like Talcott Parsons and R. K. Merton are attempting to establish a general sociological theory on the a-historical and non-evaluative pattern of the established natural sciences.[34] Their enterprise illustrates a recurring impulse of social scientists since at least the time of David Hume, the supreme empiricist, and Auguste Comte, the founder of positivism —the impulse to make a new start and to cut clear of all pre-existing social disciplines. But the current new start is unlikely to succeed

[31] For the distinction between ' substantial ' and ' functional ' rationality see Karl Mannheim, *Man and Society* (1940), pp. 52 et seq.

[32] Aron, op. cit., p. 106.

[33] Roethlisberger and Dickson, *Management and the Worker* (1934), Part IV

[34] Cf. statements to this effect by R. K. Merton and D. G. Macrae in *The British Journal of Sociology*, Vol. VIII, No. 2 (June 1957). Merton, while presently concerned with more limited theories, theories of the middle range, holds that ' there is no substitute for such efforts as Parsons's to develop a wide-ranging and comprehensive theory of the social system as a whole . . . (p. 109). Macrae is critical: ' The pattern of theory to which many sociologists aspire is one which is seldom found—and which is seldom long enduring—in the sciences of nature ' (p. 99).

where its predecessors have failed. The new 'general theory' is still highly tentative and conflicting and such empirical studies and findings as derive from it are so far of minor importance.

Gunnar Myrdal has pointed out the essential weakness of this attempt—its failure, or rather its deliberate refusal, to include in its conspectus the valuations which inevitably enter into and influence any comprehensive study of society. Value judgments, he argues, should be introduced openly. 'This is our only protection against bias in research, for bias implies being directed by unacknowledged valuations.'[35] We might add another reason. The wealth of data and of perspectives which confronts the aspiring social scientist is enormous. Chester Barnard makes the point somewhere that in any modern society there are more groups than there are individuals. The problem of direction of research, of selection of areas of investigation, is crucial. It is only too easy, if one begins with a positivist bias against bias—and a preference for hypotheses which admit of tangible and numerical verification—to be led into studies which issue in such conclusions as that china dogs come in pairs, or that people vary in their attitudes to their next-door neighbours according to temperament, or that readers of lurid Sunday newspapers are highly respectable in their week-day lives.

The method suggested by Myrdal for directing social research on to topics of greater importance and depth falls broadly within the positivist sociological tradition. He would establish his value premises on the basis of the results of careful opinion studies, 'of a perfected type which does not yet exist.'[36] But even the most careful opinion studies register only what people say they think at a particular time or times. It is here that the case for a revived political theory becomes relevant. Political theory might be regarded as a more dependable method of survey, tapping a more deeply reflective vein of opinion about values. A Locke, or a Rousseau, or a Maitland, has the knack of getting to the heart of the matter of social and political controversy, and so of indicating the growing points for further inquiry. It is at least arguable that the continuing tradition of Western political theory may yield a matrix of concepts as illuminating as the embryonic general theory of the independent sociologist, and more germane to the interests and purposes of contemporary political societies.

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[35] Gunnar Myrdal, 'The Relation Between Social Theory and Social Policy', *British Journal of Sociology*, Vol. IV, No. 3, p. 241.
[36] Ibid., p. 240.

ECONOMIC SCHIZOPHRENIA

ECONOMISTS have been in the habit of drawing a sharp line of division between producers and consumers. Each is represented as a unit of control over resources, intent upon maximising the return on those resources either in the form of profit or of utility. Profit and utility are set in sharp juxtaposition to one another and both categories are purged as far as possible of the discontinuities and inconsistencies that make human behaviour so ungeometric. Sometimes a time dimension has been introduced because short and long run considerations may conflict ; sometimes a probability dimension has been analysed as a bow to the uncertainties by which choice is usually surrounded. But producers and consumers have generally remained, in the writings of modern economists, the creatures of a series of equations, raw material for an electronic computer rather than the wayward and unpredictable creatures of everyday life.

Moreover, of the two ghostly puppets who inhabit the textbooks, it is the producer who is allowed to rattle his chains the loudest. He is a character who can be looked at with a proper suspicion both because he may act out of character and fail to maximise anything observable and because his presumed passion for maximising profit may set up a kind of Hegelian tension within the economy by simultaneously obstructing and assisting social progress. The consumer, on the other hand, is too exalted to be seen naked. Since he is sovereign, his wish is law and that is the end of the matter. Almost the only aspect of the consumer's behaviour in which it is seemly to show curiosity and cite the facts of common observation is in respect of saving and spending. The discovery that saving is limited by the need to keep up with the Jones ranks as one of the few intrusions of sociology into the economics of consumption.

The bloodlessness of the economic man, whether producer or consumer, has been a common complaint against the subject, especially from those who felt that money was an inadequate object of human ambition. Economists have generally countered that they knew what they were about even if their readers did not. All that they succeeded in establishing was the usefulness of an abstraction ; on the other hand, they entirely failed to see the danger of the abstraction. If producers are merely an unknown quantitiy in a complicated equation, they can easily be superseded by other unknown quantities in a more simplified equation. If consumers are all-powerful ciphers, they can be treated as ciphers and shorn of their power. The more the operation

of maximising is reduced to a mathematical process, the more the individual producer or consumer appears inadequate or, indeed, redundant. Either the process is automatic and so requires no managerial skill at all, or it involves too many unknowns for the individual human mind to grapple with them successfully.

Economists have abstracted in their equations from the effort of planning. They have eliminated from economic behaviour the element of management and administration that is embedded in it and have then felt obliged to reintroduce it in the form of state action. Economic behaviour does not consist exclusively in responding to price incentives, in exchanging this for that, in market-oriented activity, but embraces much that goes on *within* the firms that produce and *within* the households that consume. In the market there is an obvious antithesis between firms and households ; but the antithesis disappears when the two are looked at as administrative units. If, following Aristotle, economists had sought first to understand the activities of the household and then studied the firm as a special type of household, they would have been less seriously in error. They would certainly have done fuller justice to the activity which we call management.

Economists have also failed to do justice in the theory of demand to precisely those elements of realism on which they are accustomed to insist in the theory of production. Just as there are internal and external economies on the side of supply, so a change in consumption itself affects the valuations of other consumers. Consumption is inevitably a social activity and choice takes place under social pressures that interact with economic change. It is impossible to make sense of the activities of a firm in isolation from its market and all the productive facilities on which it draws ; similarly, it is impossible to make sense of the activities of a consumer in isolation from the market circumstances that condition his choice and the customs, habits and beliefs by which he is surrounded. The producer's activities are exploratory ; so, in a deeper sense, are the consumer's. Each fresh purchase has to be fitted, not just into an existing pattern of consumption, but into an emerging way of life. There are overhead elements on the side of demand at least as prominently as on the side of supply. The discontinuities and indivisibilities that play havoc with marginal cost theory are equally damaging to marginal utility.

The antithesis between producers and consumers has also prevented economists from conveying an adequate picture of the relationship between the two. If firms are set in sharp contrast to households, and their output is assumed to govern the standard of living, the whole maximising process is distorted. Economists and their readers, mindful

of the ultimate identity of production and consumption, come to use as the touchstone of success in an economy the volume of production which it achieves—very often, the volume of *industrial* production alone. They slur over the costly effort of marketing by which production is adapted to the pattern of consumer wants and rarely speculate on the correlative changes within households that go to determine whether an increased flow of goods and services from firms is of net benefit to the community. If one could measure consumption directly, it might quite well exhibit a falling trend or show no more than a gentle rise, while the available indices of production (and especially industrial production) were increasing comparatively steeply. The very idea of trying to measure consumption from the consumer's side will strike many economists as fantastic; and although the task could not be carried out with precision, it is extraordinary how little thought the subject now receives, and how frequently in international comparisons, entirely inappropriate measures are quoted without reservation. In the U.S.S.R., for example, no less than 70 per cent. of the output of manufactures consists of producer goods: the movement of the index of industrial production may not correspond in any way, therefore, with movements in the consumption of manufactures. There is not even a necessary presumption that consumption will one day reflect the steep climb in industrial output.

If we turn from the U.S.S.R. to the U.S.A. we find phenomena of a different kind. We are assured that one quarter of the national income consists of the unpaid services performed by housewives within the household; on this quarter, economists are almost completely silent, and on the trend in the ratio they are largely ignorant. We are told also that the American worker has at his disposal a larger stock of capital at home than in the factory where he is employed. What attention is given to capital accumulation in this very private sector? Is it not, in fact, a close approximation to the truth to regard the average American home as a small factory, highly equipped with labour-saving devices, where the housewife puts in a very long working week and her husband a rather shorter one? Of course, the tea-breaks are longer and there is some absenteeism. The money that changes hands does not altogether conform to the general conception of wages except when the younger members of the household require some incentive to co-operate; but it would be possible to cite payments on the farm and sometimes even in the factory that are not materially different. There are wage grumbles, labour trouble and even, on occasion, strikes. The household-factory may be run efficiently or inefficiently and the margin that separates the best and the worst is very wide.

When more horse-power is needed in the kitchen or the workshop, the familiar problem of finance for re-equipment emerges and if there is not enough to plough back from last year's earnings, recourse may be had to the capital market, including that large sector of it that specialises in financing consumers rather than producers.

Does this seem far-fetched? Then look at the practical consequences of the opposite view. If a factory needs more capital and borrows for the purpose, it can buy equipment free of tax, is given an initial allowance or even an investment allowance, and is egged on by public opinion, the Trade Unions and its own workpeople. Its investment is intended to increase the flow of goods for final consumption. But let the householder decide to short-circuit the process and invest on his own account and see what happens. Almost all the goods with which he can re-equip are subject to a stiff tax ; if he looks elsewhere for capital, he is snubbed and told that the country cannot afford it ; and every agency that might help him to buy on credit is put on its guard against his anti-social behaviour. The set of factories run by producers—in effect, as sub-contractors to households —are given every advantage while the set of factories that we call households—in effect, the main contractors—get kicked for their initiative.

Economists continue to analyse investment as if it were exclusively an activity of producers. They recognise, rather reluctantly, that houses are a particularly important form of investment that cannot easily be left aside in any study of capital formation. They recognise also the growing importance of consumers' durables other than housing. But it is doubtful whether they appreciate just how large a slice of capital formation is represented by such durables : the contrast between the space given to the analysis of investments in producers' machinery and the space devoted to consumers' machinery is extremely striking and quite without justification. The time has come to treat investment by consumers on the same footing as investment by producers, to measure its size, the fluctuations to which it is subject, the sources from which it is financed, and so on. We know next to nothing about the run-down in consumers' capital during the war and its re-building since the war: yet without such knowledge how can we hope to establish satisfactorily what now governs private savings (in excess of what is directly invested in durable goods)?

Let us take another example. A great deal of the time of households is occupied in those negotiations with sub-contractors which we call shopping and in visits to their establishments which involve travelling. When it is desired to increase production, as in war-time,

nothing is simpler than to do so by reducing the marketing effort that firms expend with a view to making things easier for the households that buy from them. Consumers can be deprived of delivery services, obliged to queue or to go short of what they want, put into uniform and offered standard goods. At the same time, productivity undergoes a sharp but spurious increase and consumers whose 'basic requirements' are met can be assured that, in spite of a tremendous economy in man-power, they are no worse off 'in real terms'. From this point of view, productivity is maximised by enrolling all consumers in a vast army in which consumption is 'rationalised'; the economies that are customarily associated with large-scale operation are achieved by creating units of consumption to correspond with the largest possible units of production. But if we set out to measure consumption as the consumer measures it, we are likely to reach a different conclusion. We have to deduct from what he gets all that he no longer gets; and the fact that this cannot be exactly measured does not make it any the less important.

Reflection on this example shows how entangled production is with consumption. If we try to establish what final consumption is once the exertions and inconveniences to which the consumer is submitted have been eliminated, we are chasing a will o' the wisp. The consumer cannot divide his life by a line on one side of which is consumption and on the other production. He may like or dislike the effort of shopping; he may dislike it and yet dislike it less when the whole community is obliged to shop harder for what it wants; or he may like it, but only when the effort of shopping is not complicated by queues. It may be possible to single out some acts of consumption and regard them as always pleasurable but a drain on the limited resources of the community. Other forms of consumer behaviour may economise the resources of the community and be anything but pleasurable. But a great deal of what the consumer does, at any standard of living above the minimum, does not fall neatly into either of these categories.

Exactly the same is true of production. No one is likely to detest every minute that he spends at work without making an effort to find another job. On the other hand, there can be few people who so love their work that they grudge every minute spent away from it. The fact that 'work' is paid for does not necessarily make it less satisfying than work that is not paid for. In the act of producing, a man does not cease to be a consumer any more than, in the act of consuming, he remains a producer.

This brings us back to an earlier proposition : that the activities of the firm have much in common with the activities of the household, and that economists would go less astray in analysing the former if they began from the latter. The most obvious illustration of this arises in relation to the behaviour of entrepreneurs. An entrepreneur is assumed by some economists to aim at maximising his profits while others make allowance for the diminishing marginal utility of the income that those profits will afford him. The proper distinction is surely between those businesses where the proprietor himself decides the scale and type of operations in which the firm shall engage and those in which the proprietor takes the profit and has no other interest in the business. The first type of proprietor is exactly like any other wage-earning producer, except in respect of the satisfaction that he derives from owning and running a business ; he is a consumer as well as a producer, free to decide whether he will work overtime in his factory or in his garden, whether he can aim at a high but uncertain income rather than a low and stable income without risking an unbearable disturbance in his pattern of consumption, whether the taxes that he will pay on additional income make it not worth the earning, and so on. His decisions can be understood by the same process of reasoning as the decisions of a miner or a docker whether to accept or reject opportunities of additional income.

On the other hand, the second type of proprietor is not a producer at all in this sense. He is simply a property-owner and he may be represented, with due qualifications, as interested primarily in the highest net return he can obtain. This does not mean that the businesses in which he invests are themselves conducted so as to yield the maximum return, either to their proprietors in dividends or in the net profits out of which dividend and other payments are made. Those who take the decisions are usually a different group of people who may be guided by the interests of the proprietors or may, within limits, disregard them, but whose motives cannot be analysed in terms of the normal behaviour of consumers/producers.

Yet even the activities of this group, whose interests in the profits of the enterprise they run are inevitably complex, can be understood more satisfactorily if viewed alongside the activities of the average household. The housewife has to run a household in the net income of which she has a substantial but by no means exclusive interest. She has to cope with a refractory group and seek to maintain a peaceful and co-operative relationship. She has to consider the wisdom of supplementing the family income by working outside the household, or by taking into the household work previously done for it outside.

There are problems of location: the possibility of finding better opportunities of work for the older members of the household and better opportunities of education and training for the younger. There are, as we have seen, problems of investment. Above all, there is a task of management in which the activities of each member of the household have to be organised so as to engage their energies with the minimum of friction.

Nor is it likely that any trends visible in household management will fail to leave their mark in factory management or vice versa. The discipline of the Victorian household had its counterpart in the strict discipline of the Victorian business. On the other hand, the greater freedom of women in industry has been accompanied by greater equality in the home. Machines make their way more freely into households because they have already made their way into factories. The network of loans and investments in industry is paralleled by a similar network between households. There is scope for a fuller analysis of the interactions between habits of consumption and production, of the overflow in either direction of the changes at work in factory and household.

If the sharp antithesis between consumption and production were done away with, we should gain not only a deeper insight into our society but a less mystical view of things. So long as firms are regarded as the creatures of mysterious forces that the ordinary man cannot understand, so long will these forces be regarded as evil and requiring stringent control. But the more they are seen as approximating to the households in which every man lives, the more intelligible they will seem and the less hostility will their independence of one another occasion.

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THE ESTABLISHMENT OF THE SCOTTISH STEEL INDUSTRY

In recent decades substantially more than three-quarters of all the pig-iron produced in modern industrial societies has been devoted to the manufacture of steel. In consequence, we have come to regard the smelting of iron from its ores and the actual production of steel as mere successive stages in the processes of one integrated industry. Yet this integration of iron and steel production is a relatively recent development—a development, moreover, in which Britain lagged substantially behind the United States, Germany and Belgium, and in which Scotland still lags behind the other steel-making areas of Great Britain.

The failure of the British iron and steel industries to avail themselves fully of the technical and economic developments of the late nineteenth century have already been analysed in considerable detail.[1] But the history of the establishment and expansion of steel-making in Scotland—a series of events which were to exert a potent influence on the development of the Scottish economy—still awaits examination.

Steel has been defined as 'that form of iron containing less than 2·2 per cent. of carbon (usually the range is from 0·1 to 1·3 per cent) produced in a fluid condition and hence practically free from slag'.[2] It is, in effect, a form of iron which possesses exceptional advantages in terms of tensile strength, ductility and resistance to abrasion—advantages which can be increased still further by various forms of heat treatment, forging and alloying.

Very small quantities of this material in the form of hard, high-carbon steels were produced from a relatively early date by a variety of elaborate and costly processes. In the sixteenth century, for example, Scottish craftsmen, working presumably on iron smelted in the primitive Highland bloomeries of the period, contrived to produce sword steel which could stand comparison with the finest products of Milan, Toledo and Bilbao. At a rather later date, the forge established at Cramond in the 1760's by the original partners in the Carron Company manufactured 'blistered square or faggot, and German steel', from imported Swedish bar iron, and by the end of the eighteenth century had built up a substantial market for its steels in India. A

[1] Notably by D. L. Burn, in *The Economic History of Steelmaking, 1867-1939*, and by T. H. Burnham and G. O. Hoskins in *Iron and Steel in Britain, 1870-1930*.

[2] Burnham and Hoskins, op. cit., p. 23.

limited quantity of high-carbon steel was also made at the Monkland iron and steel works at Coatbridge between its establishment in 1795 and its conversion to pig and malleable-iron production in 1825 and 1840 respectively, while a number of small forges and toolmakers were also producing similar steels at the same period.[3] But information on this quality steel industry is sparse in the extreme. The introduction of the crucible process into Scotland went unrecorded, and the only output statistics for the trade related to the 1880's when an investigator found in Scotland six firms making crucible steel, with an 'aggregate output of 1,500 - 1,600 tons per year', the bulk of it going into castings, and much of the remainder into toolmaking and the construction of iron and steel works plant.[4]

Modern steel-making is generally held to date from September 1856, when Henry Bessemer astounded the Cheltenham meeting of the British Association with a description of his convertor process for large-scale production, and proceeded to confound the sceptics by a series of demonstrations at Baxter House, St. Pancras.[5] The revolutionary implications of these demonstrations for the future operation and structure of the iron trade were speedily appreciated, and within a matter of weeks ironmasters and malleable-iron makers in many parts of the country were conducting their own experiments.

In Scotland the new process appears to have aroused an interest only slightly less intense than that generated in the South, and trials

[3] *Old Statistical Account of Scotland*, Vol. I, pp. 212-213; A. Miller, *The Rise and Progress of Coatbridge*, pp. 107-108.

[4] J. Riley, 'The Rise and Progress of the Scotch Steel Industry', *Journal of the Iron and Steel Institute*, 1885, Vol. II, pp. 394-395.

[5] *British Association for the Advancement of Science*, 26th Report, (1856). The paper which Bessemer then read was printed in full in *The Times* for 14/8/1856, and reprinted in Sir Henry Bessemer's *Autobiography*, pp. 156-161. *The Economist*, which had treated a number of earlier claims to revolutionary advances in iron and steel technology with scant interest, showed remarkable prescience in at once appreciating the importance of Bessemer's discovery. Thus at the end of August 1856, the editor published a leading article, headlined 'A Revolution', which began: 'The Revolution we are about to announce is not in Sicily against King Bomba, nor in France against the Emperor, but here in England, in science, in the manufacture of iron and in arts in which all the world is interested. What but a complete revolution in all our ideas is produced by the fact, that a blast of cold compressed air directed on a molten metal, without any fuel or ordinary elements of combustion mingled with it, lashes it into most furious heat, makes it boil and bubble and throw up scum like a soup kettle under which a great fire is blazing? What but a complete revolution has begun in the whole manufacture of iron, when it is shown that we can draw off melted iron from the blast furnace . . . into another furnace, and from it, without any further fuel except that employed to raise the steam which blows the bellows, run off in half-an-hour, into any shape, cast steel or perfectly pure malleable iron, fit for all the many purposes to which steel and iron are put? The invention of the railroad, with its adjunct the telegraph, was not the beginning of a more important revolution than is, we think, now commenced in the iron trade. . . .' *The Economist*, 1856, pp. 952-3.

of the Bessemer technique were soon under way. Thomas Jackson, proprietor of the Coats Iron Works, one of the larger forges of the Coatbridge area, took the lead. Stimulated by an article and series of drawings of the St. Pancras plant in the *Illustrated News*, Jackson quickly put together a rough apparatus, including a convertor of 5 - 10 cwt. capacity from ' lengths of old boiler tube and an old locomotive cylinder attached to the engine of a turning lathe '. In 1856 - 7 he conducted a long series of trials, using Eglinton No. 1 pig-iron (a ' very superior ' Ayrshire iron) and adhering as closely as possible to Bessemer's account of his procedures. But all his experiments failed, as did many others in England and abroad where a medium or high phosphorous pig was used. The product was ' always pure chemical iron . . . commercially valueless ', because of the impossibility of ' hitting the point when the iron could be run from the convertor to produce good malleable-iron '.[6]

While Jackson's experiments were still in progress William Dixon and Co., one of the largest firms of Scottish ironmasters, evinced their strong interest in the new process by concluding an agreement with Bessemer which, subject to technical success, secured them important advantages in the use of the patent in Scotland for a royalty of £10,000. 'A small but complete plant ' was erected at the Govan Ironworks ' under the personal supervision of the inventor (and) operations conducted for some time, Scottish iron being used in the convertor '. But the sole result was to re-emphasise the impossibility of making acid steel from Scottish medium phosphorous, medium silicon irons. ' The licencees abandoned the process, Mr. Bessemer returning the sum paid by them for their licence '.[7] These results, together with those of other less elaborate Scottish tests, led to a sharp decline in interest in the new process, and to a tendency to dismiss it as impracticable or illusory.

There followed a period of four years during which no further attempts to work the Bessemer process were made in Scotland. By 1861, however, the real merits and limitations of the new technique, and, in particular, its applicability only to low phosphorous irons, had become much clearer, largely because of Bessemer's own efforts. In that year J. N. Rowan, proprietor of the Atlas works, ' obtained a licence from Bessemer, and commenced the erection of what were

[6] W. Cockey, *On Bessemer's Process for Manufacturing Iron*, in the *Proceedings of the Philosophical Society of Glasgow*, Vol. IV, pp. 81-82 ; W. T. Jeans, *Creators of the Age of Steel*, pp. 36-54 ; R. F. Mushet, *The Bessemer-Mushet Process, or the Manufacture of Cheap Steel*, passim ; Bessemer, op. cit. ; Riley, op. cit., etc.

[7] Ibid ; *Iron and Coal Trades Review*, Vol. VI, p. 581.

then considered to be the most perfect Bessemer works, having two 3 ton convertors, and the necessary apparatus for working them on an economical and practical scale'.[8] Although this plant was planned to use Cumberland haematite pig, melted in a reverbatory furnace, many initial difficulties were still encountered. By 1863, however, these had all been overcome. 'The steel ingots produced were made into tyres, axles and forgings of various descriptions, and some of the tests applied to the axles, and which they successfully bore, show that the steel was of the highest quality.' Yet in spite of this excellence, the firm experienced great difficulty in securing orders, and their production of steel rarely exceeded 40 tons per month, 'the convertors being worked once or twice a week as was desirable'. In 1875, therefore, when a new large steel plant using the Siemens' process had been established in Glasgow, the Rowan convertors ceased to blow, and were dismantled a few years later.[9]

This Atlas plant was the only one ever to produce acid Bessemer steel on a commercial scale in Scotland. And though two considerably larger Bessemer plants were opened in Scotland in the 1880's for the manufacture of basic steel, this method of steel production never enjoyed more than a limited success in Scotland where the steel industry has always relied on the Open Hearth process to an even greater extent than in other British iron and steel centres.

The first plant in Scotland to use the Siemens Open Hearth process was built by the Steel Company of Scotland in the early 1870's. This firm, which 'more or less paved the way and made things easy for the numerous steel manufacturing companies which followed', had a remarkable origin. Scrivenor, writing in 1854, had criticised the very rapid expansion of the Scottish iron industry, and had condemned the prodigal exploitation of scarce mineral resources which it entailed. He warned of the approaching exhaustion of the Monkland black-band deposits, and suggested that when these had been worked out 'the active energies of the Scotch ironmasters might be directed to bring into operation a patent, which has lain dormant for many years . . .;

[8] St.J. V. Day, *The Iron and Steel Industries of Scotland*, in British Association Handbook, 1876, p. 57; Riley, op. cit., p. 288; Bessemer, op. cit., pp. 170-185, 288; Jeans, op cit., pp. 68-72; etc.

[9] Riley, op. cit., pp. 397-8; J. Kohn, *The Iron and Steel Manufacture*, pp. 84-85. In 1871, however, the Atlas plant was fully engaged, producing general steel forgings, and 'first class steel tyres for railways carriages'. In addition, the firm had secured a large order for steel rails from Russia, and was engaged on an English order sub-contracted to it by Krupp. In May 1872 the firm was converted into a limited company, when two representatives of a firm of Clyde shipbuilders and one representative of Neilson and Co., locomotive manufacturers, joined the board. *I.C.T.R.*, Vol. V, p. 269, Vol. V., p. 405. Day, op cit., p. 57; Riley, op. cit., pp. 397-8.

it is a patent taken out in 1818 by Mr. Mushet and Mr. William Crawshay, Jnr., of the Cyfartha Iron-works, *to make iron from copper slags'*.[10]

Seventeen years later an attempt to adopt this idea was to give rise to the modern steel industry of Scotland. In 1863 the Tharsis Sulphur and Copper Company Ltd. had opened a plant in Glasgow for the recovery of the copper and silver contained in the iron pyrites which were displacing pure sulphur as a raw material in the production of sulphuric acid. Over the years this firm accumulated 'an immense stock of the residue of their operations'—the famous 'Blue Billy' or 'Purple' ore from the Company's mines at Huelva from which the copper and silver had been recovered. Sometime in the late 1860's Mr. Charles Tennant of the St. Rollox Chemical Works and a number of other Glasgow entrepreneurs sought to find some use for this by-product, and hit upon the idea of using it as the raw material for the establishment of a new Scottish steel industry.[11]

At that period C. W. Siemens, the inventor of the regenerative furnace, was engaged in an attempt to perfect a 'direct process' of iron manufacture—that is, to produce steel or malleable-iron from the ore in a single stage, thus eliminating the use of the blast-furnace.[12] The Glasgow entrepreneurs heard of these experiments, and decided to investigate the possibility that the Tharsis residue 'might be converted into steel in a modified form of the Siemens furnace'.

Siemens was approached, his interest was aroused, and an experimental model of the Siemens direct rotary furnace was erected in Rowan's Atlas works under the supervision of the inventor. The ensuing

[10] H. Scrivenor, *History of the Iron Trade* (1854 ed.), pp. 288-290. Blackband ore was first identified and analysed by David Mushet in 1801-02. For almost thirty years thereafter, black-bands were little used by the Scottish ironmasters, but when an efficient method of pre-heating the air blown into blast-furnaces was worked out in Scotland between 1828 and 1833, these ores were at once transformed into a source of iron ideally suited to the new smelting technique. Thenceforth they were mined fiercely, as Scotland's annual production of pig-iron rose from around 37,000 tons in 1830 to almost 200,000 tons in 1840, to 630,000 tons in 1850, 988,000 tons in 1860 and over 1,200,000 tons in 1870. In the 1830's and early 1840's, the expansion of pig-iron production was in large measure concentrated in the Coatbridge area, and Miller, writing in 1864, maintained that over fifteen million tons of calcined ironstone, almost all black-band, had been charged into the blast-furnaces of Coatbridge in the 32 years to 1862. Miller, op. cit., pp. 28-33; A. McGeorge, *The Bairds of Gartsherrie*, pp. 76-77; W. Moore, *Observations on the supply of Coal and Ironstone from the Mineral Fields of Scotland*, in the *Proceedings of the Philosophical Society of Glasgow*, Vol. IV, pp. 293-306; R. Meade, *Coal and Iron Industries of the United Kingdom*, passim.

[11] J. Ferguson, *Chemical Manufactures of Glasgow and the West of Scotland*, in British Association Handbook, 1876, pp. 228-9; A. H. Sexton, *The Metallurgical Industries* in British Association Handbook, 1901, pp. 25-29; *I.C.T.R.*, Vol. V, p. 650; Riley, op. cit., pp. 398-9.

[12] W. Pole, *Life of Sir William Siemens*, pp. 196-200.

trials were not conclusive, but their promoters regarded them as sufficiently promising to justify the erection of a full-scale plant, and in the autumn of 1871 the formation of a private company with a capital of £100,000 in 20 shares of £5,000 each was under discussion. Eventually, however, it was decided that the new concern—to be known as the Steel Company of Scotland Limited—should be incorporated as a public company, and this was formally done on 9th February 1872. The provisional capital was then fixed at £105,000 in £10 shares, all of which were taken up by 28 individuals, the great majority of them men already closely connected with the chemical, iron and heavy engineering industries of the West of Scotland.[13]

Even before this formal incorporation, however, the promoters had begun to consider possible sites for the erection of their plant. Thus the official correspondence of the Steel Company (as recorded in its first and only surviving letter-book) begins on 4th August 1871, with a letter from the company's interim secretary to C. W. Siemens requesting details as to the estimated consumption of ore, pig-iron, coal and dross per ton of steel in order that a comparison might be made of costs of operation at Coatbridge and at Ardrossan on the Ayrshire coast. A number of other locations on the Ayrshire coast were also investigated, in the search for a site of 'from 70 to 100 acres' which fulfilled the following conditions—'that it should be solid ground, and there be no pits etc. running under it, that it should be level, with ample water supplies, and good railway connections with coal and iron districts: also, a large-scale works should not be regarded by the proprietors as a nuisance, and that there should be dwellings for the workmen within one or two miles.'[14]

While these investigations were in progress, James Dunlop, a nephew of Colin Dunlop of the Clyde iron works and himself a substantial coal- and ironmaster, suggested that a suitable site might be found at Hallside, some eight or ten miles south-east of Glasgow on land owned by the Duke of Hamilton. This possibility appealed strongly to the promoters, partly because of its nearness to Glasgow,

[13] The body of 28 original shareholders included, in addition to C. W. Siemens himself, two members of the Tennant family of St. Rollox and four other men connected with the St. Rollox and Tharsis companies; four members of the Arrol family of constructional engineers; Henry Dubs, the proprietor of the Glasgow Locomotive Works; Adam Paterson, a leading Glasgow solicitor; and John Moffat, an eminent civil engineer. The first Board of Directors of the Company was composed of Charles Tennant (Chairman), Henry Dubs (Deputy Chairman), Archibald Arrol, John Moffat, Archibald S. Schaw, David Wilson and John Wilson.

[14] Records of the Steel Company of Scotland, First letter book. (I am indebted to Sir Andrew McCance, Chairman of Colvilles Ltd., and to the Secretary of the Steel Company for access to these documents.)

to the Tharsis works, and to the blast furnace plants of Coatbridge, and partly because a very favourable agreement had been negotiated with the Caledonian Railway Company covering all the Steel Company's traffic over its lines. Difficulties arose over the price to be paid for unworked coal seams underlying the Hallside site, but by the end of 1871 these had been resolved, the site had been purchased, and building was about to begin.

Every effort was made to hasten the erection of the plant, but a variety of factors combined to thwart the promoters' expectations. Throughout the spring and summer of 1872 the weather was exceptionally bad, while the sharp rise in prices and wages and the scarcity of materials and labour delayed building and raised the costs of the work actually done well above the estimated levels. Siemens, though a substantial shareholder in the Steel Company, could not devote much of his time to its affairs, and this held up the provision or approval of plans, drawings and specifications. Finally, poor on-site planning by the company's officials and by certain of the contractors aggravated the position. Yet the pressure of the directors was not without effect, and in spite of ' prolonged bad weather ' in the spring and summer of 1873 the production of steel was begun in the autumn of that year, with four 6 ton Siemens regenerative melting furnaces fired by gas producers.[15]

The promoters had originally intended that the Hallside plant should specialise in the production of the new steel rails then gaining general acceptance, and had designed the finishing end of the works accordingly. But as the production of steel increased with the completion of four more 6 ton furnaces in 1874 and three 10 ton furnaces in 1875, the company found that, because of the sharp expansion of steel rail-making capacity in England and abroad, its output could not readily be sold at remunerative prices, and this although ' the cost of manufacture has now been reduced to a point which contrasts favourably with that of any other steel rail works '.

[15] Ibid. First letter book and Directors' Reports for 1872-73. The original designs for the Hallside plant were prepared by Siemens, and provided for the erection of a number of extensive and well-equipped workshops, pattern stores, etc. The Chairman's Report for 1873 declared ' the Company are now reaping the benefit in superior facilities and diminished cost of construction. When the time arrives for extension, renewals or repair of the Works, the possession of these workshops will enable the Company to execute them economically and quickly, whilst, in the event of an accident to the machinery —the patterns being on the spot—delay will be avoided in restarting '.

The directors' difficulties were accentuated by the failure of the Siemens revolving furnace built for the direct reduction of the iron pyrites purchased from the Tharsis company. Two of these furnaces were erected and began operations in 1874, but although ' puddled iron of an excellent quality (was) made direct from a mixture of half purple and half other ores ', costs of production were so very high that attempts to perfect the direct process were speedily abandoned. In 1875 the revolving furnaces and their associated plant were therefore dismantled to make way for additional standard open hearth furnaces, and this novel endeavour to produce steel in Scotland by the direct reduction of iron ores came to an end. Thereafter the Steel Company came to depend on suppliers of pig-iron and scrap for its raw materials, and became a simple steel-melting and rolling concern.

But although the accounts for 1874 and 1875 showed substantial losses, attributed in large measure to these abortive experiments and to ' the unfortunate state of the iron and steel rails trades ',[16] the directors stressed their conviction ' that there is no cause for uneasiness regarding the future success of the company '. The provisional capital was therefore increased, a substantial bank-loan raised and used to finance the building of houses for ' the officials and men ', and plans prepared for the erection of eight additional melting furnaces which would ' increase the output of steel to 36,000 to 40,000 tons per year '.

The directors did, however, appreciate the dangers of tying the future of the company too closely to the steel rail trade, and they therefore embarked upon a programme of product diversification. A cogging mill was added to the original rail mill, plate and merchant bar mills were built, the production of steel forgings begun, and a steel foundry and wheel moulding machine installed.

Diversification proved a wise policy. The company quickly earned a high reputation for the excellence of its boiler plates, and secured a large market for them. In addition, it played an important part in the development of ' plates of special soft steel for ship-building . . . of

[16] With the end of the boom of the early 1870's, prices of pig- and malleable-iron dropped sharply. The average price of Scottish mixed numbers pig-iron (f.o.b. Glasgow) fell from 117/3d per ton in 1873 to 87/6d per ton in 1874, and 65/9d per ton in 1875, and continued to drop till it reached 47/- per ton in 1879, while over the same period the average annual price of Scottish malleable-iron fell from £13 10/- per ton to £6 per ton. The result was a great intensification of competition, and a substantial number of bankruptcies in the English and Welsh malleable-iron trades. Burn, op. cit., pp. 24-32 ; *Royal Commission on the Depression of Trade,* Vol. II, Appendix I(A) ; Sir I. Lowthian Bell, *The Iron Trade of the United Kingdom,* passim.

a quality superior to the highest brands of iron plates', and of steel plates, bars, and angles for bridge and constructional work.[17]

Thus after 1876, when the company secured its first Admiralty order (and made its first modest profits), the relative importance of rails in its total output began to decline. In spite of the continuance of 'dull and limited trade' and of the severe depression and low prices ruling throughout the iron industries of the world, the company prospered during the second half of the 1870's. Its output of steel continued to expand, and, in spite of intermittent working and the low prices of rails and plates, it earned relatively large profits which enabled it to write off its early losses, to establish a reserve fund and to declare its first dividend—of 6 per cent. tax free—in October, 1879.

The demand for steel for ship-building and bridge and constructional work was by then increasing rapidly, and in 1880 the directors purchased the Blochairn Ironworks in north-east Glasgow for the sum, including the costs of conversion and re-equipment, of £145,000, the purchase being financed by selling unissued shares to existing holders at a premium.[18] Since the company still enjoyed a virtual monopoly of steel production in Scotland it had little difficulty in keeping 'the whole available plant at both works steadily at work', and the direc-

[17] Ibid. Directors' Reports for 1872-79; J. S. Jeans, op. cit., pp. 27-28; Day, op. cit., pp. 58-59; Riley, op. cit., pp. 398-401. The first steel vessels built on the Clyde were laid down by John Elder & Co. and J. and G. Thomson almost immediately after the issue of Lloyds' first set of steel rules late in 1877. By the end of 1880 some 33 steel ships, with an aggregate gross tonnage of 50,000 tons, had been added to Lloyds' Register, the majority of them coming from Clydeside yards. Over the same period almost 1,000 steel boilers were fitted in registered ships, many of them made with the Steel Company's boiler plates. For this and other information on the application of steel in shipbuilding I am indebted to Dr. W. S. Cormack's unpublished Ph.D. thesis, *An Economic History of Shipbuilding and Marine Engineering* (*with special reference to the West of Scotland*) (Glasgow. 1929).

[18] The Blochairn plant in the St. Rollox district of Glasgow was established as a small malleable-iron works sometime about 1863. In 1867, at a time when the demands of the Clyde ship-builders for malleable-iron goods, particularly high-grade ship-plates, had outrun the capacity of the local producers, Blochairn was purchased by John Hannay, a partner in the Barrow Steel Works of Schnieder and Hannay, in partnership with his two sons. The Hannays at once embarked on a great programme of expansion, erecting large banks of puddling furnaces on both sides of the Monkland canal, together with much elaborate finishing plant, so that by 1871 Blochairn had become 'the most extensive and most complete finished Ironworks North of the Tweed', with 'scientific equipment (which) bids fair to surpass every other finished Ironworks in the Kingdom'. In 1873, at the height of the boom, the Hannays sold the plant to a new company for the sum of £377,020, but still retained a substantial share in it. Nine months later the Hannays were dragged into bankruptcy when Colin Campbell, a Glasgow iron merchant, failed for over £250,000. The Blochairn company was in turn affected, and had to suspend payments at the end of March 1874. Attempts to raise additional capital and keep the plant in operation met with no success, and the works were therefore closed, and lay idle for six years until taken over by the Steel Company.

tors, raising the dividend to 9 per cent., firmly declared that 'when both works are completed, their power of production will be sufficiently great to enable them to meet the probable demand for steel in this district for many years to come'.[19]

In this, the Steel Company's directors were very far wide of the truth. On the one hand, the Scottish demand for steel—for ship-building and marine engineering, for railway and bridge construction, for structural and general engineering—continued to increase rapidly, far outrunning the capacity of the combined Hallside and Blochairn works. On the other hand, the advent of a number of new steel producers in Scotland after 1879 meant that the Steel Company, in spite of the high quality of its products, the soundness of its management, and its excellent record of technical innovation, found its relative share in Scotland's steel production falling rapidly. Throughout the 1880's, indeed, the company was relatively prosperous, declaring dividends which ranged from $3\frac{1}{2}$ per cent. in 1887, a poor year, to $12\frac{1}{2}$ per cent. three years later, and amounting in all to $54\frac{3}{4}$ per cent. on capital over the twelve years 1879-90.[20] But in the 1890's the competitive position of this pioneer company weakened as other firms with larger furnaces and more modern finishing plant entered the industry. From 1891 to 1894 the company's accounts consistently show losses which the directors attributed partly to the labour troubles which plagued the company over these years and partly to the very low prices then current for steel products. The company's results improved in the second half of the decade, but its share in Scotland's make of steel continued to fall, and by the turn of the century the Steel Company was already in grave danger of losing its place as the largest producer of steel North of the Border.[21]

[19] Records of the Steel Company of Scotland, Directors' Report for 1880.

[20] Ibid., Directors' Reports, 1880-1890. James Riley came North from Siemens Landore plant in 1878 to become General Manager of the Steel Company. It was in large measure to him, and to Henry Dubs, its first Deputy Chairman, that the firm owed its reputation for the high quality of its products and for its many minor contributions to the progress of technique. Riley played an important part in the development of soaking pits and cogging mills, and did much to increase the capacity of open hearth furnaces. When Sir Henry Bessemer visited the Hallside plant during the Iron and Steel Institute's Meeting in Glasgow in 1885 he declared, 'I have not seen during the whole of my experience such excellent material and finished work as I have seen here today'. *Journal of the West of Scotland Iron and Steel Institute*, Vol. I, pp. 15-16; *The Scottish Ironmerchant*, No. 7, p. 10; John Hodge, *From Workman's Cottage to Windsor Castle*, pp. 28-86.

[21] Records of the Steel Company of Scotland, Directors' Reports, 1891-1905. The payment of dividends was suspended for a period of six years in the 1890's, and when resumed remained at a moderate level down to the First World War. In 1920 the Steel Company was purchased by a group of Clyde ship-builders, in 1934 it was transferred to Lithgows Limited, and in 1936 was absorbed into the Colvilles group. Production at the Blochairn plant ceased in 1952 but the Hallside works is still in operation.

This displacement of a company which had made a vitally important contribution to the establishment of large-scale steelmaking in Scotland and to the adoption of steel for ship- and bridge-building, stemmed from the entry into the Scottish steel industry of a number of new and more efficient competitors.

From 1873 to September 1879 the Steel Company had been the only large-scale producer of steel in Scotland. Then, suddenly, there occurred a sharp burst of innovation in which a number of malleable-iron producers took up the manufacture of the new material. Between 1879 and 1881 Scotland's output of open hearth steel increased more than threefold, from 50,000 tons to 166,000 tons, and by 1885 had risen to some 241,000 tons, with two Bessemer steel plants erected by pig-iron producers adding approximately 100,000 tons to give a total ingot production of some 350,000 tons, equivalent to almost 19 per cent. of the total British make of steel.

The timing of this general adoption of steel-making in Scotland clearly merits examination. Fortunately, the forces at work are readily visible. First, it was only natural, after the failure of the various attempts to work the Bessemer process in Scotland, and the initial difficulties encountered by the Steel Company of Scotland in introducing the manufacture of Siemens open hearth steel, that other firms in the district should hang back until such time as the practicability and profitability of the latter process had been clearly established.

Second, the unsuitability of the pig-iron made from local ores, which, in the early 1870's, still accounted for some 85 per cent. of the charges of the Scottish blast-furnaces, meant that the introduction of steel-making tended to lag behind developments in those areas where a haematite pig-iron was locally available. But as the local ore reserves were rapidly worked out during the second half of that decade, the Scottish smelting plants became increasingly dependent on imported ores. The resulting availability of local supplies of a pig-iron suitable for the manufacture of acid steel eased the transition from malleable-iron to steel production when other factors made it necessary.[22]

Third, the general depression experienced throughout the iron trade of the world in the mid-1870's, a depression accentuated in Britain by

[22] Meade, op. cit., p. 752. The production of a pig-iron suitable for the manufacture of acid steel began in Scotland in 1872 when the reorganised Shotts Iron Company adapted one of its blast-furnaces to smelt a high-quality non-phosphoric pig suitable for use in either the Bessemer convertor or the O.H. furnace. By 1881 six per cent. of the total Scottish output of pig-iron was of this type, and by 1900 the Scottish blast-furnaces were producing 419,000 tons of haematite and 55,000 tons of basic pig-iron for steel-making out of a total of 1,154,000 tons.

the excess capacity which arose in the malleable-iron trade as a result of the rapid growth of Bessemer steel production in England, naturally made Scottish malleable-iron producers hesitant of embarking upon new and risky developments which of necessity involved heavy capital expenditure.[23]

Fourth, and most important, is the fact that the main initial markets for Bessemer and open hearth steels were the manufacture of rails and of high-grade tools and castings. Now, because of the late beginnings of large-scale malleable-iron production North of the Border, and the parallel great expansion of iron shipbuilding and of the other metal-using trades in the Scottish industrial belt, the malleable-iron makers of Glasgow and district had never been deeply engaged in the manufacture of rails. Thus so long as the use of steel was confined to high quality goods of the type made by the Sheffield firms and to the production of rails, Scottish firms had no real incentive to begin the manufacture of steel. To them the rise of the new English steel firms was reflected only indirectly in the increased competition which resulted from the entry of English and Welsh malleable-iron producers displaced from the production of railway iron into the market for ship plates, angles, bars and other rolled products.[24]

Thus although the Scottish malleable-iron firms were confronted in the mid-1870's with an urgent need to reduce costs of production if they were to avoid the bankruptcies which were so common in the industry in the South, so long as malleable-iron retained its supremacy in ship- and bridge-building, there could be no large-scale change-over to steel production in Scotland.

But when the Steel Company found itself forced to begin a policy of product diversification, and sought to market rolled steel products among local consumers, the prospects of the Scottish malleable-iron producers were at once affected. When the Steel Company succeeded in making and selling boiler-plates superior to the local malleable-iron product, when the Admiralty sanctioned the use of open hearth steel for ship construction, and itself placed orders for plates with the Steel

[23] *Commercial History and Review, 1876*, pp. 1, 19-21, and *1877*, pp. 1, 25; *Royal Commission on the Depression of Trade*, Vol. II, pp. 322-325, Vol. IV, p. xxiii.

[24] Over the years 1864-80 the aggregate production of malleable-iron in Scotland amounted to some 3,400,000 tons, or around 200,000 tons per year. Over the same period the aggregate registered tonnage of iron ships launched on the Clyde amounted to 3,263,000. Between 1860 and 1880 ship-builders used some 15 cwts. of malleable-iron for every registered ton of steam-shipping built. Thus even after allowing for the import of English and Welsh malleable-iron into the Scottish ship-yards in the 1860's and 1870's ship-building must consistently have absorbed between 65 and 70 per cent. of the total production of the Scottish malleable-iron industry.

Company, when, as a result of pressure from a variety of sources, Lloyds issued its first set of steel rules in 1877, then the Scottish malleable-iron firms could no longer ignore developments which threatened their future position. Thus as soon as it became clear that steel could with advantage be used for boiler- and ship-plates, and that, because of rapidly rising furnace capacities and rapidly falling costs, the new material was bound to displace malleable-iron in the shipbuilding and allied trades in the near future, the Scottish malleable-iron firms mainly concerned with these markets were faced with a direct choice between conversion to steel-making or eventual extinction. The majority naturally chose conversion.[25]

This became apparent in 1879-80. In May 1879, when it was fast becoming clear that the shipbuilders strongly favoured the new material, William Beardmore, the controller of the Parkhead Forge, began the construction of three 10 ton open hearth furnaces and forced through their completion with such speed that the first cast steel was made less than four months later. In the same year Williams and Co., a medium-sized malleable-iron firm engaged principally in the production of sheets and plates, laid down three open hearths at their plant at Wishaw.

In the following year, 1880, the pace quickened. While the Steel Company bought Blochairn and embarked on further expansion at Hallside and William Beardmore added two more furnaces at Parkhead, two new firms entered the industry. The Mossend Iron Company, a malleable-iron firm which produced up to 50,000 tons of finished plate- and bar-iron each year for the shipyards, put down five open hearths, and David Colville, his Dalzell Ironworks now firmly established, erected four 10 ton Siemens furnaces.[26] In the next three years extensions were made at all these plants, and in addition five other firms, four malleable-iron makers and one iron-founder, installed open hearth furnaces and began to turn out rolled steel products and steel castings. Thus by 1885 the Scottish steel industry

[25] Initially, steel hulls were substantially dearer than iron. But with the rapid fall in costs of production, the price of Scottish ship plates fell from £20 per ton in July 1876 to under £7 per ton eight years later. Further the greater tensile strength of mild O.H. steel led to a considerable reduction in the weight of the scantlings used. Thus steel soon became the cheaper material. The share of steel-hulled vessels in total launches on the Clyde rose from 10·3 per cent. in 1879 to 19·5 per cent. in 1881 and 97·2 per cent. in 1889. Cormack, op. cit., pp. 150-155; Riley, op. cit., p. 402, plates VI-VIII.

[26] David Colville evidently foresaw the impending displacement of malleable-iron by steel, for soon after the completion of the Steel Company's Hallside plant 'he sent his youngest son to Newton (i.e. Hallside) to undergo a lengthy training and obtain by first-hand practical experience a thorough understanding of the processes employed'. Souvenir booklet *Jubilee of David Colville and Sons. Ltd. 1871-1921.*

consisted of ten firms, with 73 open hearth furnaces and an annual output of over 240,000 tons, equivalent to some 42 per cent. of the total British make of Siemens steel.[27]

Until that date the expansion of the Scottish steel industry beyond the level attained by the Steel Company had depended almost entirely on the efforts of the established malleable-iron makers. The firms in the primary or blast-furnace section of the industry, though substantially larger and better endowed than the malleable-iron makers, had stood aloof from the new developments.[28]

This aloofness stemmed in large measure from the fact that, in the middle and late 1870's, the Scottish smelting industry was passing through a period of very real strain. For while the general demand for pig-iron had declined sharply from the boom levels of the early '70's, the Scottish smelters found their costs of production rising steadily, and this at a time when they had lost some of their main markets overseas and had to encounter very severe competition, first in England and Wales, and later even in the Scottish home market, from Cleveland pig-iron selling at prices from 10 to 20 per cent. below the Scottish level. These difficulties were accentuated by the fact that by the late 1870's most of the pioneers of the great expansion of the Scottish smelting industry had died or retired, leaving their firms in the hands of less able or less courageous men. Since most of the Scottish smelting firms had only a limited direct interest in the forge and foundry branches of the industry, they tended to concentrate on attempts to strengthen the position of the blast-furnace section and to leave the building of steel-furnaces to others. In the early 1880's, however, the competitive position of the smelting firms was considerably improved by the introduction of by-product plants which recovered the tar, pitch and ammonia from the blast-furnace gases, and therefore reduced the costs of production of Scottish pig-iron by some 6/- per ton.[29]

Yet even with this accession of competitive strength, the majority of the Scottish smelters showed no immediate appreciation of the benefits which could be secured by extending their activities forward to include the manufacture of steel. There were, however, a number

[27] *Journal of the Iron and Steel Institute*, 1901, Vol. II, pp. 24-25; *Journal of the West of Scotland Iron and Steel Institute*, Vol. XXI, pp. 45-47.

[28] The Mossend Iron Company was, however, in large measure controlled by the Neilson family, who also had a large interest in the Summerlee Iron Company, a blast-furnace firm.

[29] Meade, op. cit., passim; J. Percy, *Metallurgy*, Vol. II, pp. 474-475; *Journal of the Iron and Steel Institute*, 1885, Vol. II, p. 17; *Journal of the West of Scotland Iron and Steel Institute*, Vol. XXI, pp. 18-19, and Vol. XLVII, p. 66ff.; *Journal of Institution of Engineers and Shipbuilders in Scotland*, Vol. XXXIX, pp. 187-194.

of exceptions. The Glasgow Iron Company, a concern which from its foundation in 1845 had always been heavily engaged in the malleable-iron section of the industry, had seen its established markets in the shipyards and elsewhere endangered as its competitors began the production of steel plates, bars and sections. In 1884-5 it responded by erecting a set of three 7 ton Bessemer convertors alongside the blast-furnaces at its Wishaw works, fitting them with the basic linings devised by Gilchrist and Thomas. Simultaneously, Merry and Cunninghame, then one of the more progressive firms in the smelting section of the industry, laid down an elaborate plant with four 8 ton basic Bessemer convertors, and modern ship-plate and bar mills close to the blast-furnaces at their Glengarnock works. The ban which Lloyds placed on the use of basic Bessemer steel for ship construction in 1887 caused grave difficulties to these firms, since it obliged them to add a number of Siemens furnaces to their existing equipment in order to maintain their sales to the shipyards. But while the convertors at the Wishaw plant were then scrapped, those at Glengarnock were retained and continued in operation alongside the new open hearths as the sole instance of Bessemer steel production in Scotland.[30]

Thereafter the expansion of the industry continued down to the end of the century. A number of other steel works using the open hearth process were set up to produce plates, angles and other rolled steel products, some by new companies specially floated, others by firms already established in the coal and iron or malleable-iron industries. By the early 1890's there were ten large steel works in Scotland, plus a substantial number of smaller concerns engaged either in the production of limited quantities of rolled products or, more usually, in meeting the growing demand for steel castings and special tool steels. In addition, a number of the surviving malleable-iron firms, faced with the declining demand for their traditional products, began to use their finishing plant to re-roll semi-finished steel goods.[31]

The Scottish make of open hearth steel increased proportionately from the 241,000 tons of 1885 to 485,000 tons in 1890 and 964,000 tons in 1900, a figure which was raised by the inclusion of Bessemer and special steels to over the one million tons mark. With its plants producing one-third of the total British make of open hearth steel, and over 20 per cent. of the British output of all types of steel, the Scottish steel industry was, by the end of the nineteenth century, firmly established.

[30] *Journal of the West of Scotland Iron and Steel Institute*, Vol. XXI, p. 46 ; Cormack, op. cit., p. 152 ; Burn, op. cit., pp. 174-175.
[31] Sexton, op. cit., pp. 25-29.

But this important Scottish industry already showed certain weaknesses—weaknesses which were to exert an adverse influence on the economy of Scotland as international competition in the production of steel goods increased in the twentieth century. In common with the steel industries of England and Wales, the Scottish industry suffered from two major disadvantages. First, the average size of its plants was low in comparison with the giant concerns which appeared overseas—notably in the United States and in Germany—and this in an industry where the technical economies of scale were of the greatest importance. Second, there was much less vertical integration—particularly of iron-smelting with steel-making and heavy rolling—than overseas, or even in certain of the English and Welsh centres. Most of the Scottish steel plants were sited well away from pig-iron works, and even where steel plants were erected near blast-furnaces, minor technical difficulties, or mere conservatism, prevented the effective adoption of the hot-metal system of working which soon became general overseas.[32]

Further, the Scottish smelting industry had reached its peak in efficiency and prosperity in the third quarter of the nineteenth century. This industry had grown great on the production of forge and foundry irons smelted from native black-band ores in small coal-fired blast-furnaces. As supplies of black-band ores and splint coal became increasingly scarce after 1870, and new competitors arose, first in Cleveland and later overseas, who used very much larger coke-fired blast-furnaces to produce high-quality pig-irons at prices substantially below the Scottish levels, the Scottish iron industry entered on a long period of decline. In the closing decades of the nineteenth century this industry was only saved from sharp contraction by the temporary stimulus derived from the introduction of by-product recovery plant, and by the more permanent advantages which stemmed from the rapid expansion of steel-making in Scotland.

But while this latter development, together with the continued expansion of the shipbuilding, heavy engineering and other metal-using trades, enabled the Scottish ironmasters to accept the progressive reduction of their export sales of pig-iron in the 1880's, 1890's and 1900's, and even enabled them to increase the annual make of pig to an all-time peak of 1,400,000 tons in 1910, the opportunities which this expansion provided for the radical overhaul of the location, plant and techniques of the Scottish smelting industry were not, unfortunately, taken. Instead the old, and by contemporary standards, extremely

[32] Board of Trade, *An Industrial Survey of the South West of Scotland* (1932), pp. 51-62.

small blast-furnaces remained in operation in their old locations, and, as the competitive strength of the Scottish smelting industry progressively declined, it came in time to act as a positive incubus on the steel-making and iron-founding trades, and indirectly, on all the metal-using industries of the Glasgow conurbation.[33]

The Scottish steel industry reacted to this situation partly by the creation of restrictive associations, partly by expanding the use of scrap in open hearth furnaces well beyond the levels current elsewhere, and partly by relying increasingly on pig-iron and semi-finished steel imported first from England and later from the Continent.

The elimination of these weaknesses began during the First World War when the firm of David Colville and Sons Limited embarked on a large-scale programme of amalgamation comparable to those movements which had characterised the American, German and Belgian industries during the preceding 25 years. By the early 1930's the new firm of Colvilles Ltd. had not only brought the bulk of Scottish steel-making and heavy rolling capacity under one control, but had also extended its activities back to the mining of coal, iron-ore and lime-stone. In addition, the firm extended its facilities for the production of a wide range of finished steel products, began the production and erection of structural steel-work and developed the utilisation of by-products.

The depressed state of the heavy industries in the inter-war years prevented any very effective steps being taken towards the integration of iron-smelting and steel-making, but a tentative advance towards the adoption of the hot-metal system in Scotland was made when plant was installed to carry molten pig-iron from the blast-furnaces of the old Clyde Iron Works across the river to the Clydebridge steel plant laid down on the opposite bank in 1888.

Since the end of the Second World War the modernisation of the Scottish iron industry, and its effective integration with modern steel-making and rolling plant, has been pursued vigorously. The blast-furnace plant of the Clyde Iron Works has been completely reconstructed ; a new blast-furnace plant is coming into operation at Ravenscraig, alongside the Dalzell and Lanarkshire Steel Works ; and work has begun on the reconstruction of the Gartsherrie works of Bairds and Scottish Steel Ltd.

[33] The history of the Scottish iron, malleable-iron and iron-founding industries in the nineteenth century is examined in detail in my unpublished Ph.D. thesis, *The Economic History of the Scottish Iron and Steel Industry (with particular reference to the period 1830 to 1880)* (London, 1955).

When these projects are completed the development which began with the formation of the Steel Company of Scotland in 1871-2 will at last have reached fruition, and Scotland will at length possess a modern, fully-integrated iron and steel industry.

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STATISTICAL PRODUCTION FUNCTIONS AND ECONOMIC DEVELOPMENT[1]

THE concept of the production function, indicating a relation between various factor inputs and output of a product, appears in economic theory and, though with slightly different emphasis, in econometrics. In economic theory, the form of the production function is considered as affecting the decisions of the entrepreneur regarding the employment of different factor combinations, in response to their relative prices; the possibility of giving the concept a precise meaning has, however, been queried by Joan Robinson and others.[2]

In econometrics, the main interest lies in the input-output relations themselves and the numerical values of the constants entering into such a relation. Here again, there are different approaches: the micro-economic approach of Leontieff and others, in which production functions for various industries are studied but the factors are usually taken as maintaining fixed proportions; the macro-economic approach, on the other hand, which is associated with the names of Cobb and Douglas and studies the economy as a whole or at least a large section of it, but takes labour and capital, and perhaps other factors as well, in variable proportions.

The original form of the Cobb-Douglas production function is:

$$P = b L^k C^j$$

where P indicates production, L labour, C capital, and b, k, j constants; of these, b can be made equal to 1 by suitable choice of units and is of little interest. In generalised form, other factors may be introduced in a similar fashion, or time may be brought into the equation, usually in the form of an exponential function.

A knowledge of the constants j, k would be of the highest importance for economic development planning, for it would tell us about the increase in output which would be brought about by a given capital investment programme, or vice versa, about the capital required to make an increase in output of given magnitude possible. The question is: do we know anything about the values of these constants? In an analysis of American manufacturing, Cobb and Douglas obtained the result that $k = \cdot 75$, $j = \cdot 25$.[3] On the basis of subsequent investiga-

[1] I am greatly indebted to Professor A. K. Cairncross of the University of Glasgow and to Professor T. W. Swan of the Australian National University for suggestions and comments.

[2] Joan Robinson, 'The production function and the theory of capital', *Review of Economic Studies*, Vol. 21, 1953-4, No. 55.

[3] Charles W. Cobb and Paul H. Douglas, 'A theory of production', *American Economic Review*, Vol. 18, Supplement, March 1928.

tions, Douglas claimed that these values are of very wide applicability. That is to say, an increase in the amounts of capital and labour employed by a given percentage would generally raise output in the same proportion—returns are constant to scale—whilst an increase in labour alone by, say, 1 per cent. would increase output by approximately $\frac{3}{4}$ per cent., and an increase in capital alone by 1 per cent. would increase output by $\frac{1}{4}$ per cent.

Despite a lot of critical discussion which the results of Cobb and Douglas have received, e.g. by Mendershausen,[4] the figures have been widely quoted and utilised. For example, Tinbergen and Polak, introducing a slight modification, suggest that the elasticity of production is: ·7 with regard to labour, ·2 with regard to capital, ·1 with regard to land.[5] Palvia has based a development plan for India on a production function for industry with elasticities ·75 and ·25 for labour and capital respectively, and a production function for agriculture with elasticities ·5 and ·5 for labour and land.[6] Belshaw bases part of his analysis of underdeveloped countries on a production function with elasticities ·75 and ·25, although admittedly not attaching excessive weight to these figures.[7]

In support of his thesis, Douglas claimed that the results obtained in various studies are essentially consistent with each other.[8] Since his technique has been used by other investigators, it seems worth while to compare some of the econometric production function studies and their results. This has been done with regard to 45 studies and sets of results, and the comparison is set out in the appendix.

The studies differ from each other in various ways. In particular, they can be said to belong to three types: (a) comparisons between different dates, (b) comparisons between different areas or units of production at the same time, (c) cross-section studies comparing different industries. The results of type (c) studies are influenced by price ratios of different products and are therefore generally considered to carry less weight than the others, though they are used as corroborative evidence. Another classification is by industrial field covered, which is: agriculture in studies 1 - 4, coal mining in studies 5 - 9,

[4] Horst Mendershausen, 'On the significance of Professor Douglas' production function', *Econometrica*, Vol. 6, No. 2, April 1938.

[5] Jan Tinbergen and J. J. Polak, *The dynamics of business cycles* (London, 1950). p. 122.

[6] C. M. Palvia, *An econometric model for development planning* (Institute of Social Studies, The Hague, 1953).

[7] Horace Belshaw, *Population growths and levels of consumption* (London, 1956).

[8] Paul H. Douglas, 'Are there laws of production?' *American Economic Review*, Vol. 38, No. 1, March 1948, pp. 20-21.

manufacturing in studies 10 - 41, manufacturing plus other sectors in 42 - 43, and the whole economy in 44 - 45.

The statistical treatment also differs with regard to the series used to indicate labour and capital, the additional factors introduced—if any—and the treatment of time as a possible variate. Furthermore, in some of the studies the *a priori* assumption has been made that the elasticities for labour and capital add up to 1, and only one of them has been independently determined ; in this case the figure for labour has been shown in brackets. In other studies, the elasticities are separately determined ; in some cases, both procedures have been adopted alternatively. For this reason and also because additional variables may be used or omitted in the multiple regression analysis, more than one set of results is listed under some reference numbers. A different reference number has, however, been given where different basic data have been used.

A glance at the tabulation given shows that there is by no means such uniformity in the results as the adherents of the Cobb-Douglas theory would have us believe. While elasticities with regard to capital in the neighbourhood of ·25 are common, figures around ·5 and higher have been obtained in many instances. Similarly, elasticities with regard to labour vary between very low figures—about ·1 or ·2—to figures exceeding 1.

This is not really surprising, for the statistical difficulties inherent in the nature of the problem are indeed great. For one thing, it is difficult to obtain satisfactory basic data, and in particular, the construction of an index of real capital presents a tricky problem. Furthermore, there is often multicollinearity between the variables, and the regression coefficients become unreliable. In particular, if the effect of unspecified factors, represented in the equation by time, does not follow a simple trend, or if the trend is the same as that of the main variables, it may not be possible to isolate it satisfactorily from the influence of capital.

There are more fundamental objections yet. One implication of the Cobb-Douglas theory is that output per head is determined by the ratio of capital to labour employed, and that an increase in capital per head brings about an increase in output per head but to a much smaller extent. This may be queried from either of two angles. On one hand, it may be argued that capital is much less important in promoting economic progress than other factors ; on the other hand, it may be thought that capital has a more important influence than that which such a model would suggest.

These two views are not as contradictory as one might think at first. The distinction between the correlation and the regression aspect is a familiar one to statisticians. It is quite feasible for the correlation between output and capital to be low, because a large part of the variation in output is explained by other factors, and at the same time for the regression coefficient of output per head on capital per head—or, strictly speaking, their logarithms—to be high.

The first point has been most forcibly argued by Cairncross, who considers technical innovation, managerial and operative skill, industrial climate and similar factors as more important than capital investment.[9] Very often, however, all these factors go hand in hand, so that we can get out of this difficulty by considering an increase in capital in a wider sense, i.e. as embracing an increase in these other factors.

The second point is brought home by a comparison of capital-income ratios in countries which are at different stages of economic development. According to the Cobb-Douglas theory, output and therefore income should increase at a far slower rate than capital, so that the capital-income ratio should be far higher in highly developed than in under-developed countries. But this is not borne out by the facts ; as shown, for example, by Colin Clark, the evidence seems to point to virtually constant capital-income ratios.[10] This may be interpreted in different ways : either that an increase in capital per head brings about a roughly proportionate increase in output per head, or that an increase in output engenders proportionate capital requirements. Whatever the economic interpretation, the statistical picture is that of an elasticity of output with regard to capital in the neighbourhood of 1. This would seem to imply either that the elasticity of output with regard to labour is near 0, or that the sum of the elasticities is in excess of 1 ; in other words, either zero marginal productivity of labour or increasing return to scale.

In econometric production function studies, it is generally either assumed *a priori* that the elasticities with regard to labour and capital —plus other factors where any are introduced—add up to unity ; or it is anticipated that such a result will be obtained, and if it is not, the statistical analysis is generally rejected. But the logical justification for this assumption may well be queried. It will be argued here that it is essential to distinguish between production functions referring to capital widening and capital deepening.

[9] A. K. Cairncross, ' The place of capital in economic progress ' in *Economic progress* (ed. Leon H. Dupriez), (Institut de Recherches Economiques et Sociales, Louvain 1955).

[10] Colin Clark, *The conditions of economic progress*, 2nd edition (London, 1951), pp. 503-4.

The difficulties which are inherent in the measurement of capital will be neglected here, and it will be assumed that a satisfactory indicator for capital can be obtained. Furthermore, the economy as a whole will be considered in the same way as a single industry, and differences between capital requirements of different sectors of the economy will be left out of account.

Consider first a given technique, in which labour and capital are combined in fixed proportions. Then production can be assumed to increase roughly in the same proportion as labour and capital employed. The limiting factor may be either labour, in which case the capital stock will normally not be fully employed, or capital, in which case labour will not be fully employed, or total demand, in which case both factors may be underemployed. Total available labour and capital then do not enter into the production function except as limiting factors ; it is labour and capital utilised which bear a relation to output. Furthermore, a Cobb-Douglas type production function is not obtained, since C and L remain in a fixed ratio ; elasticity of output is 0 with regard to one factor alone but 1 with regard to both factors.

The relevant case for under-developed countries is, of course, the one in which C_{max}, the total available capital in the short run, matters and L_{max}, the potential labour supply, does not matter. Writing also $g = \frac{C}{L}$, the production function may be written as

$$P = b\,L, \text{ provided that } C \leq C_{max}$$
$$\text{or } L \leq \frac{C_{max}}{g}$$

(b being a constant).

Thus, so long as L_{max} is large,

$$P_{max} = \frac{b}{g} C_{max}$$

and if we want to compare different situations with the same technical ratio g but with different capital stocks C_{max}, this is the relevant relationship.

Now let there be a change in the technique used, and let capital be combined with labour in a different proportion—in practice in a higher proportion. This may be accompanied by an increase in the total stock, but we may say that it will mean a movement into a different dimension. It will not mean a multiplication of the existing productive equipment, but rather the creation of different equipment, like automatic looms in place of hand looms. In the new circumstances, the production function may be of the same form as the one given above, though with a different constant b and with a different range for L within which it is valid. The upper limit for L to which the relation $P = b\,L$ applies, that is to say, the maximum amount of labour that can usefully be employed, will be higher or lower than

previously according to whether C_{max}, the total capital stock, or g, the technical ratio between capital and labour employed, is increased more.

But for a comparison between these two situations and any others that may arise with further changes in technique, the relevant production function is of a different form. It seems permissible to take b as varying in proportion to g^j, where j is a constant. There is, of course, no guarantee for the relationship to be of that form, but it is a convenient hypothesis which may be retained. It follows that

$$P = b' g^j L \text{ provided that } L \leq \frac{C_{max}}{g}$$

Since $g = \frac{C}{L}$ we can also write

$$P = b' \frac{C}{g^{1-j}} \text{ provided that } C \leq C_{max}$$

This can be interpreted as follows :

(a) So long as there is idle productive capacity to employ additional labour, the elasticity of production with regard to labour can be taken as 1. This actually represents the combined effect of the additional use of labour and capital.

(b) Where capital is fully utilised but labour is not, we can ascribe to the elasticity of production with regard to capital the value 1, an increase in capital being taken in the sense of capital-widening. Again, this represents the effect of using more labour and capital.

(c) With a change in production methods, implying the use of more capital per worker, the elasticity of output with regard to capital is equal to j. Here we are dealing with the effect of capital-deepening, the amount of labour used being held constant.

(d) We could also say that the elasticity of output with regard to labour is $1-j$; this figure would represent the effect of using the same amount of capital but more workers per unit of capital in connection with a change in production methods. This interpretation, however, seems less natural than the interpretation of j as elasticity with regard to capital.

It is clear that in this scheme—which is of course an oversimplified one but which, it is suggested, presents a useful abstraction—there is no longer any question of two independent elasticities. It is true that it would in a formal sense be correct to state that

$$P = b' C^j L^{1-j}$$

but this expression is not very meaningful, since C and L are not free to vary independently. Whilst there is no change in production methods, C and L remain in the same proportion ; and when there is a change, the ratio is determined by technical considerations.

RESULTS OF ECONOMETRIC PRODUCTION FUNCTION STUDIES

Ref. No.	Author	Field	Area	Time	Type	Elasticity with regard to			Comments
						Capital	Labour	Other Factors	
1	Tintner	408 farms	Iowa	1939	(b)	·38 = ·04 + ·18 + ·16	·09	·38 = ·10 + ·28	Capital = improvements, liquid assets, working assets. Other factors = land, cash operating expenses.
2	Tintner	609 farms	Iowa	1942	(b)	.26 = ·05 + ·21 + ·00	·16	·45 = ·29 + ·16	As in 1.
3	Tintner	Agriculture	U.S.	1920-41	(a)	·90	2·77	—	Time trend : $10^{\cdot 009t}$. Weighted regression.
4	Lomax	Agriculture	U.K.	1926-45 (1924-47)	(a)	·37	·18	—	Time trend : $10^{\cdot 004t}$. 5-year moving averages used for basic data. Fertilisers considered but excluded.
5	Rhodes	Coal mining	G.B. (8 regions)	1923-25, 1927-38	(a)	·49	(·51)	—	Average for regions.
6	Lomax	Coal mining	G.B.	1927-43	(a)	·29	·79	—	Time trend: $10^{-\cdot 007t}$.
7	Lomax	Coal mining	25 districts G.B.	1945	(b)	·21	(·79)	·57	Other factor : seam thickness.
8, 9	Leser	Coal mining	G.B. (8-9 divisions)	1943-53	(a)	·60/·48	·42/·51	—	Time trend : irregular.
10-13	Douglas & Cobb	Manufacturing	U.S.	1899-1922	(a)	·15-·30 or ·10-·31	·63-·81 (·69-·90)	— —	4 sets of basic data. In set IV time eliminated (result ·30, ·63, or ·31, ·69).
14-19	Douglas & others	258-556 manuf. industries	U.S.	1889, 1899, 1904, 1909, 1914, 1919	(c)	·25-·43 or ·25-·47	·51-·76 (·53-·75)	— —	
20	Douglas & Handsaker	Manufacturing	Victoria	1907-29	(a)	·23 or ·29	·84 (·71)	— —	
21	Douglas	Manufacturing	N.S. Wales	1901-27	(a)	·20 or ·14	·78 (·86)	— —	
22-26	Douglas & Gunn	85-138 manuf. industries	Australia	1912, 1922/3, 1926/7, 1934/5, 1936/7	(c)	·34-·49 or ·36-·50	·52-·64 (·50-·64)	— —	

	Gunn	manuf. industries		1923/4, 1927/8		or ·25-·40	(·60-·75)	—	
30	Douglas & Gunn	125 manuf. industries	N.S. Wales	1933/4	(c)	·34 or ·34	·65 (·66)	— —	
31-34	Douglas & Daly	163-167 manuf. industries	Canada	1923, 1927. 1935, 1937	(c)	·48-·58 or ·48-·58	·43-·50 (·42-·52)	— —	
35	M. Brown	Manufacturing	New Zealand	1915-16, 1918-35	(a)	·49 or ·49	·42 (·51)	— —	
36	Williams	Manufacturing	New Zealand	1923-40	(a)	·46	(·54)	—	
37	Williams	Manufacturing	New Zealand	1938/9	(c)	·51	·46	—	
38	G. Browne	17 manuf. industry groups	S. Africa	1937/8	(c)	·32	·66	—	
39	G. Browne	85 manuf. industries	S. Africa	1937/8	(c)	·37	·65 = ·45 + ·20	—	Labour : whites, natives.
40, 41	Lomax	All manuf. industries	U.K.	1924, 1930	(c)	·18/.13 or ·16/·12 or ·17/·13 or ·14/·11	·72/·75 (·84/·88) (·73/·77) (·96/·99)	— — — —	 Assuming sum of elasticities = ·9 Assuming sum of elasticities = 1·1
42	Wall	Manuf. & mining	U.S.	1920-40	(a)	·93 or ·49	1·34 1·46	— —	Time trend : $10^{.09t}$. Time trend : $10^{.08t-.06t^2}$.
43	Leser	Industrial production	G.B.	1870-1912	(a)	·23	(·77)	—	Time trend considered but excluded. Independent determination of elasticities also considered but rejected.
44	Tintner	Whole economy	U.S.	1921-41	(a)	·34	2·13	—	Time trend : $10^{.006t}$ Weighted regression.
45	Olson	Whole economy	24 countries	1937	(b)	·59 or ·58 or ·78 = ·50 + ·28 or ·89 = ·48 + ·41	·29 ·19 ·23 ·35	— ·13 — −·18	Capital = energy. Capital = energy; other factor: land. Capital = energy, livestock. Capital = energy, livestock; other factor: land.

(a) = Time comparison. (b) = Inter-firm or inter-area comparison. (c) = Inter-industry comparison.
Bracketed figures not derived independently.

Now if we carry out a linear regression analysis of $\log \frac{P}{L}$ on $\log \frac{C}{L}$, we may in fact obtain the relation $\log \frac{P}{L} = j \log g + \log b'$ and thus an estimate for j by comparing different periods or areas. This is in fact the original procedure adopted by Cobb and Douglas, and the result may possibly be interpreted as an elasticity of output with regard to capital, or the result for 1 - j possibly as an elasticity of output with regard to labour; but the two elasticities have no independent meanings. Similarly, if we work out a linear regression of log P on log C and on log L, we may obtain estimates for j and $1-j$ as regression coefficients.

Actually, the position is a little more complicated than that. In addition to labour-saving innovations, which we have considered here and which tend to employ a larger capital stock with a given labour force, there are also capital-saving innovations which tend to produce the same output with the same amount of labour but with less capital. Hitherto it had been tacitly assumed that the capital used is the minimum required together with a given labour force to produce a given output target. Owing to imperfect technical knowledge, this state of affairs may not always be realised. There may thus be certain periods during which capital is being unnecessarily inflated, and in consequence the value of j derived for such a period is lower than the normal value. In other periods, when capital-saving is prominent, the reverse occurs, and j is overestimated. Something of this nature appears to have occurred in econometric studies dealing with the pre-war and inter-war periods in the United States, the United Kingdom and other countries. For this reason, the results of production function studies based on time series extending over comparatively short periods, even a few decades, are as suspect as the results of cross-section studies.

Thus, it may not be possible to get a reliable estimate of j from a short-period comparison. A long-term comparison for any one economy, or a comparison between economies at different stages of development, may yield a reasonably accurate estimate. It is quite possible for its value to be in the neighbourhood of 1, as suggested by the observed comparative constancy of the capital-income ratio; that is to say, it is quite possible for an increase in capital, with a constant working population, to produce an approximately proportionate increase in output and national income. But it is not legitimate to split up an observed increase in output into two components, from which elasticities of output with regard to labour and capital respectively could be obtained. An increase in capital per worker associated with capital-deepening may yield a nearly proportionate increase in

output ; in addition, so long as labour is not fully employed, capital-widening may have the same effect by bringing more capital and labour into the production process. But the two phenomena are on quite different levels.

The lesson for the under-developed countries is that capital investment, accompanied by technical education and other factors, can be expected to have a more important effect on economic development than that suggested by the numerical results obtained by Cobb and Douglas and in similar studies. While there is open or concealed unemployment, capital-widening may produce a proportionate increase in output ; in addition, at this stage or at a later stage, capital-deepening may raise output approximately in proportion to capital, and not merely by a quarter of the relative addition to capital. Even for a highly developed country, the figure of ·25 is likely to understate the true effect of capital investment on output to a considerable extent.

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THE PRACTICAL USES OF INPUT-OUTPUT ANALYSIS

I

It is twenty-one years since Professor W. W. Leontief published his first empirical study of American economic structure.[1] During this comparatively short span, the method of inter-industry accounting, and the model of economic interdependence which Leontief adapted from the Walrasian theory of general equilibrium, have made great strides and have been widely imitated. Outside the United States and Canada, where the most ambitious researches have been carried out, there now exist input-output tables for the United Kingdom,[2] Holland,[3] Israel, Italy,[4] Denmark,[5] Norway and Sweden, while, further afield, Australia,[6] New Zealand,[7] and Japan[8] are now numbered in the growing catalogue of economies whose industrial inter-relatedness warrant the adoption of this kind of 'statistical cartography'. There are many other nations, of which India and Jugoslavia are good examples, on the threshold of industrialisation, where the application of input-output calculations still rests at the margin of profitableness; and there are even a few of the so-called 'underdeveloped' territories where the hazards of national income accounting have not deterred braver spirits from trying their hand at sectoral accounts.[9]

To attempt an appraisal of the input-output approach to the economic statistics of so diverse a group of countries must plainly be beyond the scope of this article. It is proposed, therefore, to omit

[1] W. W. Leontief, *Structure of American Economy* (First Edition, Harvard 1937).

[2] T. Barna, 'The Interdependence of the British Economy', in *Journal of the Royal Statistical Society, Series A*, Vol. CXV, Part I, 1952. See also Blue Books on *National Income and Expenditure, 1953-1956*. A more detailed study, by the present author, the Department of Applied Economics, University of Cambridge, and the Board of Trade, relating to 1948 is to be published shortly.

[3] *Papers and Proceedings of the International Conference on Inter-Industry Relations*, Driebergen, Netherlands, 1950.

[4] For accounts of several European studies, see *The Structural Interdependence of the Economy* (ed. T. Barna) (Wiley, 1956).

[5] P. N. Rasmussen, *Studies in Inter-Sectoral Relations* (North Holland Publishing Company, Amsterdam, 1956).

[6] Burgess Cameron, *Inter-Industry Relations in the Australian Economy* (available in mimeographed form, to be published).

[7] *Sectoral Accounts of New Zealand*, constructed by the New Zealand Statistical Office, 1955.

[8] *Input-Output Tabulations of the Japanese Economy*, Ministry of Commerce, Tokyo, 1957 (in mimeographed form).

[9] D. Seers and C. R. Ross, 'Development Problems in the Gold Coast, 1952', and A. P. Thorne, 'Size, Structure and Growth of the Economy of Jamaica' in *Social and Economic Studies*, Vol. 4, No. 4, Supplement.

altogether from consideration the uses of input-output analysis in any but industrialised economies and in fact to concentrate largely on the practical value of the method in this country.[10] Broadly speaking, there are three ways in which the technique can be applied. These are, first, the *accounting* uses, with which the next section deals; second, the use of the input-output model for *forecasting* purposes discussed in Section III; and third, the *analytical* uses, some of which are indicated in Section IV.

II

Inter-Industry Accounting

It is usual, when considering the accounting, as distinct from the model-building, properties of input-output analysis, to begin by saying that the method represents an extension of national income accounting that elaborates the pattern of current transactions between productive sectors. The manner in which this kind of accounting complements the aggregate approach can, perhaps, most easily be described with the aid of a small input-output tabulation, given in the accompanying Table I. The entries in this table all relate to 1956, those in heavy type being reproduced from the aggregate accounts of the Blue Book on National Income and Expenditure and from the Trade Returns. The italicised figures are those representing the inter-industrial transactions. It must be emphasised, however, that these figures, shown in the square formed by the first six rows and six columns of the table, do not constitute, in any real sense, independent estimates of sectoral inputs and outputs in 1956. They simply provide an illustration by way of an up-to-date version of the inter-industry pattern of transactions in 1950.[11]

To understand its uses, it is first necessary to say a little about the way in which an input-output table is put together.

The classification, on which the two-way statement of inputs and outputs depends, can be on as small a scale as is represented here, with only six sectors, or it can be extended, in principle at least, to the point at which there is one sector per product. In practice, anything from 35 to 450 sectors have been found to be a useful range for any practical accounting purposes. The choice depends on availability of data and on how much detailed information about input structures or sales analyses is desired. The table here follows the normal practice of setting

[10] For an appraisal of the limitations of the method in unspecialised economies, see A. T. Peacock and D. G. M. Dosser, 'Input-Output Analysis in an Under-developed Country: A Case Study', in *Review of Economic Studies*, Vol. XXV, No. 66, October 1957.

[11] See Table 17 of the 1955 Blue Book on National Income and Expenditure.

TABLE I

INPUT-OUTPUT TABLE: UNITED KINGDOM, 1956

(Provisionally estimated from published sources)

£million 1956

Purchases by / Sales by	Agriculture etc.	Mining etc.	Manufactures	Building and contracting	Gas, electricity and water	Other	Total intermediate outputs (Cols. 1-6)	Final buyers				Total final output (Cols. 8-11)	Total output (Cols. 7+12)
								Persons	Government	Capital formation	Exports		
	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Agriculture, forestry, etc.	—	—	*773*	—	—	—	*773*	**700**	**12**	—	**15**	**727**	*1,500*
2 Mining and quarrying	*8*	—	*270*	*50*	*190*	*70*	*588*	**140**	**12**	**5**	**85**	**242**	*830*
3 Manufactures	*340*	*90*	—	*570*	*110*	*760*	*1,870*	**5,450**	**670**	**1,560**	**3,150**	**10,830**	*12,700*
4 Building and contracting	*44*	*30*	*100*	—	*10*	*71*	*255*	**250**	**157**	**1,230**	**18**	**1,655**	*1,910*
5 Gas, electricity and water	*29*	*15*	*175*	*25*	—	*85*	*329*	**420**	**47**	**95**	**9**	**571**	*900*
6 Other industries and trade[a]	*140*	*25*	*1,353*	*115*	*108*	—	*1,741*	**4,800**	**2,500**	**150**	**925**	**8,375**	*10,116*
7 Imports	**154**	**6**	**2,065**	**55**	**5**	**350**	**2,635**	**1,039**	**92**	**340**	**162**	**1,633**	**4,268**
8 Wages, Profits, etc.	**795**	**664**	**6,914**	**1,075**	**437**	**8,054**	**17,939**	—	—	—	—	—	**17,939**
9 Taxes on expenditure *less* subsidies	*—10*	—	*1,050*	*20*	*40*	*726*	**1,826**	**610**	**10**	**10**	—	**630**	**2,456**
10 TOTAL INPUT	*1,500*	*830*	*12,700*	*1,910*	*900*	*10,116*	*27,956*	**13,409**	**3,500**	**3,390**	**4,364**	**24,663**	*52,619*

[a] Transport, communications, distributive trades, financial and other services, public administration and defence, public health and education services, ownership of dwellings, etc.

out the sales along the rows of the array, and the purchases down the columns—all changes in stocks are 'posted' to the column headed 'Capital formation', so that sales can be identified with outputs and purchases with inputs. All transactions can be expressed either at producers' prices, i.e. ex-farm, ex-factory or f.o.b., or at purchasers' prices, i.e. delivered, retail or c.i.f. valuations. Depending on which set of prices is employed, the trading and transport margins are shown as being sold to (a) the buyer, (b) the seller of the product being distributed. The figures in the illustration are all expressed at producers' prices, so that persons, for example, are represented as buying £5,450 m. from Manufacturers at ex-works valuations, the trading margins appropriate to these and all other Household Consumers' material purchases being included in the £4,800 m. 'bought' from 'Other industries and trade'.

Accounting logic demands a balance ; and input-output statements balance in that each sector's total output must be equal to its total input. This property is demonstrated by the first six rows and columns of Table I. What this means, in other words, is that

Total sales (Gross output) $\equiv$ Inter-industry sales + Sales to final buyers.

Total purchases (Total inputs) $\equiv$ Total materials bought + Total incomes generated.

Therefore, since Total output of each sector is, by definition, identically equal to Total input,

Gross output $\equiv \Sigma$ (Material inputs + Incomes generated).

The connection between inter-industry accounting and national accounting is thus quite apparent, since the value added by, or Net output of each sector is equivalent to that sector's Gross output less the cost of Materials it buys in any period. This is another way of stating the familiar relationship that Net output is the same, in the aggregate and for each sector of an economy, as the incomes generated. Hence the main feature that distinguishes inter-industry accounting from national income accounting is the emphasis given by input-output tabulations to the material inputs from other sectors ; to the transactions, therefore, that cancel one another out in the consolidated form of national accounts developed from Keynesian aggregate analysis. These properties are illustrated in Table I where the sum of rows 7, 8 and 9—incomes generated, net indirect taxes and imports—is the same as the sum of columns 8, 9, 10 and 11—the final expenditures. The balance between these two aggregative sides of the national accounts is, of course, still maintained when the same figures, represent-

ing inter-industry transactions, are added both to factor inputs and to final outputs.

One of the practical accounting uses follows—that of providing a check, in more or less detail, on the national income accounts. If the input-output table is built up, as it should be in practice, from production data specifying the sectoral origin of purchases and the destination of sales, then final expenditures can be estimated for each sector by deducting its sales to other industrial sectors from its total sales. Similarly, total outlays by a sector less the material inputs to that sector leave net outputs as a residual ; so it is possible, given adequate data, to arrive at the incomes and expenditures of aggregate accounting by means of inter-sectoral accounting. At present, however, the existence of two comparable sets of independent data on incomes, outputs and expenditures is still a rare bird in economic statistics, although the preparations of input-output tables has pointed the way to many improvements in the national accounts.

A more interesting use of the method, from the business man's point of view, is the information that a fairly detailed input-output chart provides about an industry's markets and cost structure. It is useful to have spread out in front of one an interlocking jig-saw puzzle of the industrial economy, showing quantitatively the different degrees of interdependence that exist during any accounting period between any chosen set of sectors. The scale on which the map of the economic structure is drawn can be very large for some industries and, within the same presentation, quite small, i.e. highly aggregated, for other sectors. In this way, the method makes efficient use of what statistical data on inputs and outputs there may be, without having to resort to guesswork where the data are lacking. There is no reason, therefore, why input-output transactions cannot simultaneously be recorded between products, processes, establishments, firms, industries and any aggregations of these categories. A general view of the economic structure can thus be combined with a particular or micro-economic approach to the accounts of any individual sector.

Above all, the input-output array is useful for the sense of proportion it helps to instil. There are no such entities as ' export trades ' or ' basic industries ' when one has taken a second look at an input-output table, since each sector is seen clearly to depend on certain other kinds of production, and the indirect connecting links may often be as important, quantitatively, as the more obvious ones. But this aspect of inter-relatedness can more appropriately be left to Section IV, under analytical uses. The point to emphasise here is that the comprehensive frame of reference available in an input-output table imparts numerical

perspective to the well-worn notion that all economic variables depend on one another.

III

Forecasting Uses

Systematic prediction requires a model, a theory relating independent and dependent variables. The assumptions underlying the Leontief model, or theory of production, are simple. They state that every input is proportionally related to output *within a given sector*, i.e., that there are constant returns to scale, and that there is no substitution between inputs *within a given sector*. As a device for forecasting changes in outputs, industry by industry, the model cannot, therefore, be expected to peer further into the future than the pace of technological change, and the rate of substitution, will permit.

The only reason why the production function in Leontief models is so rigidly simple is to facilitate calculation in practical terms of structural relations. It is, therefore, unfair to criticise the Leontief model on the grounds that as a theory of production it is naïve in the extreme. The appropriate test is how well the assumptions do when some practical question is put, such as ' What will import requirements be if the government increases defence spending? '

But how does the input-output table help to provide an answer to this sort of question? The first step is usually to convert the transactions in the inter-industry quadrant of the table into fractions of total output, sector by sector. Thus, the left-hand part of Table I would become an array of input-output ratios, expressing the *direct* relationship that each element in a column bears to the total output (= total input) sector by sector. This can be seen from Table II where the first six rows and columns, the imports and net incomes from Table I have been expressed as decimal ratios, the sum of each row or column being set at 1·000.

The next step is to take into account the *indirect* requirements that any assumed change in demands may generate. If, for example, an increase of £100 m. in manufactures is demanded, then the direct input-output ratios tell us that £10·7 m. of output from ' Other industries and trade ' will be required. But this derivative increase in output of ' Other industries, etc.' in turn feeds back a demand for £10·7 m. × 0·079 = £0·845 m. from Manufacturers—and so in a diminishing series of induced increments. Manufacturers must ultimately supply not only the £100 m. directly demanded but the contingent inputs to ' Other industries ' which in turn supply outputs to Manufacturers, as shown in Tables I and II. It is one of Leontief's

great achievements that he has demonstrated by means of matrix algebra how these indirect requirements can be specified along with the direct input-output ratios without a tedious series of iterative approximations to the solution of the simultaneous linear equations in his model. This process of 'inverting' the direct input-output ratios yields a ready-made device for forecasting, sector by sector, the levels of output, import requirements, or any of the specific inputs classified in the original input-output table, from which this inverse matrix is itself derived.[12]

TABLE II

DIRECT INPUT-OUTPUT RATIOS, 1956

(Based on provisional estimates given in Table I)

Purchases by / Sales by	Agriculture etc. 1	Mining and quarrying 2	Manufactures 3	Building and contracting 4	Gas, electricity and water 5	Other 6
1 Agriculture, forestry, etc.	—	—	0·061	—	—	—
2 Mining and quarrying	0·005	—	0·021	0·026	0·212	0·007
3 Manufactures	0·227	0·106	—	0·298	0·122	0·079
4 Building and contracting	0·029	0·036	0·007	—	0·011	0·007
5 Gas, electricity and water	0·019	0·018	0·014	0·013	—	0·008
6 Other industries and trade	0·094	0·032	0·107	0·060	0·120	—
7 Imports	0·103	0·008	0·163	0·028	0·006	0·034
8 Wages, profits, etc.	0·530	0·800	0·545	0·564	0·485	0·794
9 Net taxes on expenditures	−0·007	—	0·083	0·011	0·044	0·071
10 TOTAL INPUT	1·000	1·000	1·000	1·000	1·000	1·000

It is usual to think of the Leontief model as being 'open' in the sense that it cannot predict any changes until either the final demands to be made upon the productive sectors or alternatively the initial or factor inputs into the productive sectors have been specified quite independently. It is typical of this kind of economic model that it will only provide a limited kind of conditional forecast. The assumptions necessary before the inverse matrix of input ratios will give a forecast

[12] A good example of an inverse of an input-output table is given in Table 18, *National Income and Expenditure, 1956.*

are, first, the proportionality assumption of the Leontief model itself, and then an assumption independently of the model about future final demands or net incomes.[13]

One variant of this type of prediction will demonstrate the limitations of the technique. If it is desired to know the imports of raw materials that might be required in 1960 to satisfy an all-round rise in output of say 10 per cent. above the level ruling at the end of 1957, then multiplying through the import-content ratios by the 10 per cent. rise in outputs will certainly produce an answer. But it cannot claim to be anything more than a first approximation to a 'real forecast', because the input ratios involved are average, not marginal relationships, or rather, the assumption is that they do not differ. There is, in fact, a good deal of evidence to support the *a priori* view that the marginal import content of output is apt to differ considerably from the average ratio as observed for the compilation of an input-output table. The import requirements for the motor industry depend, for a start, on whether the sheet capacity of the steel mills is being fully used, so that any additional demands for motor bodies have to be met by importing at a higher marginal than average rate per thousand motor bodies.

The exercise, therefore, in which an assumed change in final demands to be made on the productive sectors is transformed by the process of matrix multiplication into 'answers' about changes in supply depends, as do so many analytical tools in economics, on certain other things being equal. The 'other things' in input-output prediction are, first that average equals marginal input ratios, second that productivity changes are zero, third that no substitutions take place, i.e. that there is no economising that will upset the fixed input-output ratios obtained from one year's observed data. The technique should, therefore, be regarded as complementary to other forecasting methods. Its own contribution, and it is an important one, is the systematic handling of what may be called the 'multiplier' effect on different industries' levels of output due to the indirect demands generated within the productive structure when final or direct demands made on any industries' outputs change.[14]

[13] For an example of this kind of conditional forecasting exercise, using Dr. T. Barna's 1935 input-output table, see A. A. Adams and I. G. Stewart, 'Input-output analysis: an application', in *Economic Journal*, Vol. LXVI, September 1956.

[14] See R. M. Goodwin, 'The Multiplier as Matrix' in *Economic Journal*, Vol. LIX, 1949, p. 537.

IV

Analytical Uses

The fact that prices are held constant so that the input-output ratios can approximate to technical proportions suggests a possible analogy between price-quantity index numbers and the array of input-output ratios. The ratios given in Table II, taken as they stand or inverted, can be thought of as sets of weights in a base-year, 1956. By expressing how important any industry is to any other industry as a source of supply, these ratios or weights enable the repercussions of demand changes to be traced, as we have just seen in the previous section in a strictly proportional manner. From Table II, for example, a fall of £10 m. in building output would imply a drop of nearly £3 m. in purchases from manufacturers, and this in turn would mean a further fall in building activity of £21,000, since the ratio in row 4, col. 3 is 0·007 : 1.

If the weights in a retail price index remain unchanged over a period of years, the index number comes closer to reflecting the true changes in the general level of retail prices. Similarly, if the input-output ratios remain unchanged, they will permit a more accurate determination of outputs, industry by industry, if the quantitative changes in demand are stated, prices also remaining constant. Alternatively, the price-quantity dichotomy can be applied in input-output analysis by assuming full employment of all physical resources, for example, and using the input-output ratios as average cost-price ratios. In this way, it would seem possible to use the Leontief model to shew the proportional changes in costs and prices, industry by industry, of a given change in, say, wages or the price of fuel. One theoretical implication of this use of the Leontief assumption of linear proportionality is that all demands are perfectly inelastic with respect to price changes. However, one constantly hears 'spokesmen' for certain industries claiming that an increase of x per cent. in wages or fuel prices compels them to raise prices by $\frac{x}{y}$ per cent. If $\frac{x}{y}$ turns out to be a much larger ratio than would appear from comparing the ratio of wages or the fuel bill to gross output in an up-to-date input-output table, then it could be inferred that the profit ratio is also being fully maintained. This kind of application is not as straightforward as it may sound, because once again, economic theory leads us to expect that marginal considerations, rather than average unit costs, play the major part in price determination.

What can profitably be done by way of analysis is to use the base-year *quantity* input-output ratios as a standard against which to

observe changes in input-output ratios over time. In this way by comparing input-output ratios, *at constant prices* in two or more years, perhaps 1948 with 1954, it is possible to learn much about the *changes* in the structure of production as technology advances, as productivity improves, as certain industries grow relatively to others, as economies due to scale or to substitutions take place.

It must be emphasised here that the Leontief model provides no device for explaining or deriving price changes from quantity data, nor quantitative changes in the input-output ratios from data about prices or costs. The basic analytical approach, as in index-number analysis, is that values can initially be separated into price and quantity components and that thereafter price comparisons, and quantity comparisons, can be developed along parallel lines, as it were, that cannot meet in any unique general explanations of economic behaviour.

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THE ECONOMIC WRITINGS OF FRANCIS HORNER

INNUMERABLE writings testify to the pride we take in the Scots tradition in political economy, but it could hardly be said that we have done much to remind the world of this by providing easy access to the works of the masters. It is paradoxical that the most important contribution to the propagation of Scots economic gospel has been made in recent years by the London School of Economics.[1] To-day we use Cannan's edition of the *Wealth of Nations*. The first authoritative study of the work of Sir James Steuart, the work of an Indian research student at the London School of Economics, has just been published.[2] The Reprint Series of that institution includes the work of Fleeming Jenkin,[3] M'Culloch,[4] and it now adds to its list a selection of the economic writings of Francis Horner[5] edited by the American scholar, Professor F. W. Fetter, who has already put us in his debt by his detection of the authorship of economic articles in the *Edinburgh Review*.[6]

Horner was born in 1778, the son of an Edinburgh merchant. He was one of a remarkable generation nurtured by the Royal High School which included Scott, Jeffrey, Brougham and Cockburn. 'Grave, studious, honourable and kind' is how Cockburn describes his school-mate in his *Memorials*, and his testimony is echoed in the many tributes he received on his premature death at the age of 38. A co-founder of the *Edinburgh Review* with Jeffrey and Sidney Smith, his main place in history is as the chairman of the famous Bullion Committee. Professor Fetter makes is clear in his biographical notes

[1] It should be noted, incidentally, that, apart from the works mentioned below, Hume's economic writings were recently edited by an American scholar. See *David Hume: Writings on Economics* edited by Eugene Rotwein. It is some comfort, perhaps, that Mr. C. R. Fay's *Adam Smith and the Scotland of his Day* was sponsored by the University of Glasgow, and that Mr. A. V. Cole has recently advanced the claims of Lauderdale to fuller recognition (see A. V. Cole, 'Lord Lauderdale and his "Inquiry",' *Scottish Journal of Political Economy*, June 1956).

[2] S. R. Sen. *The Economics of Sir James Steuart*. G. Bell & Son for the London School of Economics and Political Science, 1957.

[3] Fleeming Jenkin, *The Graphic Representation of The Laws of Supply and Demand*. Reprints of Scarce Tracts in Economics and Political Science, No. 9, 1931.

[4] J. R. M'Culloch, *The Literature of Political Economy*. Reprints of Scarce Works on Political Economy, No. 5, 1938.

[5] *The Economic Writings of Francis Horner in the Edinburgh Review 1892-6*. Edited by Frank Whitson Fetter. Reprints of Scarce Works on Political Economy, No. 13, 1957.

[6] F. W. Fetter, 'The Authorship of Economic Articles in the Edinburgh Review, 1802-47', *Journal of Political Economy*, June 1953, pp. 232-59.

that he deserves to be regarded as something more than a mere mouthpiece for Ricardo.

Before considering Horner's writings, it is perhaps interesting to consider Horner's connection with the *Edinburgh Review*. The *Review* is generally remembered for the Whig politics of Brougham and Smith and the rather acid literary criticism of Jeffrey. As Professor Fetter shows, the *Review* as an economic journal was of primary importance, having been forced to devote more and more attention to economic issues as they dominated politics in the first decades of the nineteenth century. In contrast to Jeffrey and Brougham, Horner's own articles were not partisan. Even that violent opponent of the *Review*, 'Christopher North', exempted Horner from this charge. It was Horner's aim to see the *Review*, not only as a medium for propagating his own views but also as a forum for discussion. It was he who recruited Malthus to its ranks, thus beginning the long connection of the *Review* with some of the great writers on economics in the ninenteenth century.

The famous Speculative Society seems to have been the first body to hear Horner's views on money. 'I find the circulation of money a rather dark subject though a few gleams of light have struck me' are the words found in his paper.[7] His early despair at mastering the subject soon deserted him, for not much later the *Review* publishes his commentaries on Lord King's attack on the Bank of England's lending policy and his brilliant review of Thornton's *Inquiry into the Nature and Effects of the Paper Credit of Great Britain*, both of which are reproduced in this volume. Professor Hayek[8] maintains that Horner's review of Thornton was the main cause of the latter's immediate influence, not least because Horner's exposition of Thornton's ideas is a good deal more systematic than that of Thornton (as Horner himself claims!).

This is not the place to assess Thornton's contribution to monetary theory, especially as it has become better known in recent years. Sufficient is it to mention that he was a major critic of the crude quantity theory, placing much emphasis on the importance of the motives for holding money, that he anticipated the purchasing power parity theory and the theory of international values, and finally that he anticipated the modern distinction between the market and the 'natural' rate of interest. However, Horner provides something more than a systematisation of Thornton's rather rambling discourse. He

[7] See Professor Fetter's Introduction, p. 5.

[8] See his Introduction to the reprint of Thornton's work in The Library of Economics, George Allen and Unwin, 1939, pp. 47 and 51.

roundly criticises him for confusing the sterling and bullion price of commodities which leads Thornton into a trap (in which he has preceded many students) in having assumed that a rise in prices (and thus a devaluation in terms of bullion) makes goods dearer to foreigners. As Horner argued, an internal inflation would raise the market price of bullion above the mint price, and encourage the export of gold. Other things being equal, it is this effect of the price level which would cause balance of payments trouble and not the supposed increase in prices to foreign buyers.

On the practical issues of banking policy, Thornton and Horner saw eye to eye. As they argued, the fixing of bank rate at 5 per cent. because of the usury laws, meant that the Bank of England was under severe pressure to lend. This restriction asked too much of an organisation which, if then recognised as a national institution, was still a commercial concern. Horner's summary of Thornton's views on the functions of the central bank is masterly : 'To limit the total amount of paper issued and to resort, whenever the temptation to borrowing is strong, to some effectual principle of restriction ; never to diminish greatly the sum in circulation, but to let it vibrate only within certain limits ; to afford a slow and cautious extension of it, as the general trade of the country is enlarged ; and to permit a temporary increase during an extraordinary period of difficulty or alarm' (p. 51). But it is worth adding Horner's own reflection on the constitutional implications of this view. 'If the Bank of England must now be considered as a national establishment, not merely influencing . . . the state of commercial circulation, but guiding its movements according to views of public policy, an important revolution has taken place. . . . Some of the functions of sovereignty are united to those of a trader ; and the opportunities of banking profits are blended with a trust and charge of the public interest. . . . The organisation of this establishment, possessed of such means to control the operations of commerce . . . may, into our political constitution already so complicated, introduce a new principle of action, the effect of which cannot be clearly discerned. Perhaps an unbounded field will be opened to ministerial influence. Perhaps an unexpected control may be gained to the people, over the views and measures of the executive . . .' (pp. 51-2).

I must resist the temptation of quoting from Horner's less flattering reviews of the literature of his day, but an exception must be made in the case of his attack on Canard's *Principes d'Economie Politique*. It was only with the interest shown some years ago in the work of Cantillon that Monsieur Canard was exposed as something of a plagiariser. More interesting in this context is Canard's attempt to

introduce algebra into his treatise, a fact which has gained him the reputation of being one of the first mathematical economists.[9] Horner, as the translator of Euler, was not to be taken in by the pedantic use of equations to explain 'truths, of which the ordinary enunciation is intelligible and familiar to all' (p. 65). He is indeed sceptical of the use of mathematics in political economy, although he would not 'exclude altogether the use of analogies borrowed from mathematical learning'. But, without denying the justice of Horner's attack on Monsieur Canard's equations, the reviewer finds in Horner's terse description of the nature of the then modern algebra the neatest apology for its use in economics—'the peculiar forms of expression which have been introduced into the modern analysis, are sanctioned by the facilities which they afford, both of perspicuous abridgement, and of prosecuting a train of investigation to new and remote results'. 'Perspicuous abridgement' is indeed a beautifully succinct description of the function of mathematical economics.

In an early number of the *Review*, Horner expressed the wish to see a full-scale work on the problem of Highland emigration, and his wish was granted in 1805 when Selkirk's famous defence of emigration was published. But for a short note, Horner's discussion of *Observations on the Present State of the Highlands of Scotland* was his last piece of writing on economics in the *Review*. It is Horner's and not Selkirk's pen we admire in the opening account of the economic condition of the Highlands in the late eighteenth century—compulsory reading it should be for economic historians. There is a modern ring about it all. We can appreciate the sane support offered to Selkirk's schemes for emigration—'emigration is not the evil but the remedy; the sad, but single resource of those by whom the real evil is suffered' (p. 124)—and his distrust of schemes for Highland development. No doubt military gentlemen (if they read the *Review*) were as upset at Horner's remarks on the Highlands as a recruiting ground for soldiers as their descendants are at the merging of the Highland Light Infantry and the Royal Scots Fusiliers. 'The Highland regiments . . . have been approaching, in their composition and character, a similarity with the other regiments in the service, ever since the advance of rents became considerable' (p. 123). (To Horner, clan loyalty rested to a major extent on the combination of low farm rents and the power of the chief to dispossess tenants).

[9] Schumpeter, however, deliberately excludes Canard from his list of early mathematical economists, sharing Horner's poor opinion of Canard's equations.

As Schumpeter has put it, 'we stand to profit by visits to the lumber room', and it remains for the reviewer to express our debt to Professor Fetter for directing us to the appropriate corner and for blowing away the dust which provides damaging proof of our neglect of the work of a fine economist. Some more rummaging by the followers of the Scots tradition might be appropriately done by local loyalists.

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CHRISTIANITY AND ECONOMIC PROBLEMS[1]

In these days of increasing specialisation, any attempt to bridge the gaps between the different fields of knowledge is welcome. The gap between theology and economics has come to be a particularly wide one, though one of mutual ignorance and suspicion, rather than of active hostility. Christian social thinkers, reared often in a classical and philosophical tradition, have usually known little economics, and have also tended to look askance at a discipline which they feel to be unduly concerned with the glorification of material wealth and unduly involved in what are thought of as the evils of modern industrial society. Economics, on the other hand, grew up under the influence of the individualistic and utilitarian philosophy of the early nineteenth century, and while modern economists have long recognised the limitations of this, yet in their concern to be scientific they have been chary of ethical judgments, and still more of the transcendental claims of theology.

Mr. Munby has done us all a service in bringing together the presuppositions of these two fields of study, both concerned with man and society, but approaching the subject from such different points of view. Written by a Christian economist, the book is essentially a plea for fuller recognition, especially by Christian social thinkers, of the essential part which a knowledge of economics must play in the understanding of society. He is concerned to point out the gross errors into which ignorance of economics has sometimes led even the most profound and far-sighted of Christian social thinkers. It deserves to be read by all Christians who take seriously the social implications of their faith, and indeed by all who are concerned to understand more fully the wider implications of this business of getting our living together in a complex modern world. It would be valuable reading for the student of economics also, even if only as an antidote to the narrowly analytical approach characteristics of so much economic theory.

Part II of the book, which seeks to apply the general principles to certain particular problems of general concern, is worthy of special notice. In it will be found discussions of such themes as Wealth and

[1] D. L. Munby, *Christianity and Economic Problems*. London, Macmillan, 1956. 290 pages. 25s.

Poverty, Full Employment and Inflation, the Price System, the Place of the Business Man in Society, the Workers and their Organisations, State Action in the Economic Field, and the International Scene.

An added interest is given by the series of apt quotations with which each chapter begins.

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BOOKS RECEIVED

Federal Reserve Operations in the Money & Government Securities Markets, by Robert V. Roosa. (Federal Reserve Bank of New York, July 1956.)

Economic Fictions, by Paul K. Crosser. (Philosophical Library, New York, 1957. $4.75.)

Accounts Receivable Financing as a Method of Business Finance, by C. W. Phelps. (Educational Division, Commercial Credit Co., Baltimore.)

Judicial Economics, by A. P. Winston. (4601 Horseshoe Bend, Austin, Texas, 1957. $1.00.)

Pakistan Economist. (A fortnightly review of economic, commercial and political events. 8 annas.)

Arthaniti. (A bi-annual journal of the Department of Economics, Calcutta University. 5 rupees.)

Economic Affairs. (A monthly journal on planning, finance, etc. Bookland Private Ltd., 1 Sanker Ghosh Lane, Calcutta, 6. 8 rupees per annum.)

Economic Review of Greece. (A monthly bulletin. Research Bureau, Prime Minister's Office Information Department, Athens.)

Scottish Agricultural Economics, Vol. VIII. (H.M.S.O., Edinburgh, 1957. 3s.)

RECENT ECONOMIC TRENDS

The Scottish Banks' Interest Rates

The fact that the Scottish banks publish an agreed list of interest rates on bills, loans and advances, and deposits applying to all Scottish business gives us some definite information about their policy in regard to these rates. In this note we review the level and movement of the Scottish banks' interest rates, both before and since the war, and make some comparisons with the English banks' rates—so far as the much scantier information on the English position allows. After the more or less factual account of the Scottish rates we comment on some points of interest arising out of them.

The broad policy governing the movement of Scottish rates is the same as that of the English banks: the various rates are altered in step with Bank Rate, although their relations to this Rate are by no means rigid, and there is a bottom stop when Bank Rate falls below a certain level. The published rates on advances make a distinction (of ½ per cent.) between 'cash accounts' which are overdrafts made against a first-class security, and 'overdrafts', which are overdrafts either unsecured, or backed by a security of less than first-class status. A 'short loan' rate is also given, this being a rate on straight loans for periods of one to three months, against marketable (though not necessarily quoted) securities, with prepayment of interest. These rates, together with the rate on deposit receipts, are the ones that we shall discuss here; the post-war changes in them are shown in the following table:

INTEREST RATES OF SCOTTISH BANKS
(PUBLISHED MINIMA) 1945 - 57
PER CENT.

	31/12/45	8/11/51	12/3/52	17/9/53	13/5/54	27/1/55	24/2/55	16/2/56	7/2/57	19/9/57
Cash Accounts	4	4½	5½	5	4½	5	6	7	6½	8½
Overdrafts	4½	5	6	5½	5½	5½	6½	7½	7	9
Short Loans	3½	4½	5½	4½	4½	4½	5½	6½	6½	8½
Deposit Receipts	½	½	1½	1½	1	1½	2	3	2½	4½
Bank Rate	2	2½	4	3½	3	3½	4½	5½	5	7

It is always stressed that the published rates are minimum rates and the question arises as to how far they represent the rates actually charged. A Scottish banker giving evidence before the Macmillan

Committee claimed[1] that the only discrimination in rates was between secured and unsecured accounts, but the remarks of his fellow witness cast a little doubt on the matter,[2] and it is actually stated in a Scottish banking manual,[3] published under official auspices, that the minimum rates are 'applicable only to the best cases in each category'. Also, there is another source of latitude in that the rate agreements do leave the definition of security to the banks themselves, and it is acknowledged that some borrowers may be charged the secured rate on what is, in effect, an unsecured overdraft.[4] But in spite of the obvious possibilities, one surmises that there is not much discrimination in business contracted at the Scottish rates. The main element of discrimination in Scottish bank lending probably enters through some firms—the large ones—being permitted to contract their loans through the London offices where the Scottish rates do not apply (the grounds for this view will appear later when we have compared the level of rates in Scotland and England). This means that interest rate practice is probably not very different from that in England where such discrimination as there is, is in favour of the big borrowers.[5] It is probable that the distinction drawn between borrowers on the basis of security is more pronounced in Scotland, but the latitude in the definition of security may tend to blur this difference also.

What is the relation of the published Scottish overdraft and deposit rates to Bank Rate, and how does the post-war position compare with pre-war? In the evidence before the Macmillan Committee it was stated (Q.2725) that the Scottish rates on secured and unsecured overdrafts were normally 1 per cent. and 1½ per cent. over Bank Rate, with a minimum of 4½ per cent., and with a narrower margin when Bank Rate went to 5 per cent. and over. This is borne out for the inter-war years by the actual rates themselves: on every occasion when Bank Rate was 4 or 4½ per cent., the Scottish secured rate was 1 per cent. over, but with a 5 per cent. Bank Rate, it was only ½ per cent. over and on the one occasion of a 7 per cent. Bank Rate, the margin disappeared.[6]

[1] Committee on Finance and Industry, Cmd 3897, Minutes of Evidence, Q 2728 (Mr. George J. Scott, Bank of Scotland). For a recent re-assertion of this see the article 'Scottish Banking Policy', by Mr. David Alexander, General Manager of the National Bank of Scotland, Ltd., in *The Accountant's Magazine*, October 1956, p. 542.

[2] Minutes of Evidence, QQ 2726-7 (Sir Alexander K. Wright, Royal Bank of Scotland).

[3] J. D. C. Dick, *Interest, Commission and Charges*, Scottish Banking Practice No. 4 (Institute of Bankers in Scotland), 2nd Ed., p. 25.

[4] Committee on Finance and Industry, Minutes of Evidence, Q 2729; Dick, op. cit., p. 26.

[5] See T. Balogh, *Studies in Financial Organisation* (Cambridge, 1947), p. 75. See also the rates quoted from *The Banker* on p. 69 below.

[6] All the changes in the Scottish overdraft and deposit rates, from 1914 to 1945, are given in Dick, op. cit., Appendix.

When Bank Rate fell from 4 to 3½ per cent. the Scottish overdraft rates remained stationary, but with a 3 per cent. Bank Rate, the secured rate fell to its minimum of 4½ per cent. The rate on deposit receipts was normally 2 per cent. below Bank Rate, with the margin narrowing to 1½ per cent. with a 3½ per cent. Bank Rate, and to 1 per cent. with a 2 per cent. Rate.

There have been three changes of note since the end of the last war. In 1945 the rate for secured overdrafts went down to 4 per cent., that is, below the traditional minimum; also, in response to the official request, the deposit rate was lowered to ½ per cent. Secondly, and more importantly, since the revival of Bank Rate policy in 1951 the margins of the various rates above and below Bank Rate have been greater than pre-war: the rate on secured overdrafts is now 1½ per cent. over Bank Rate, while the deposit receipt rate is 2½ per cent. below (narrowing to 2 per cent. when the Rate falls to 3 per cent.). Thirdly, there is now no narrowing of the margin between the overdraft rates and Bank Rate, when the Rate stands high—with the present 7 per cent. Rate the margin of 1½ per cent., for secured overdrafts, has been retained.

How do these rates compare with English bank rates? Such evidence as we have about English rates confirms the commonly held view[7] that the Scottish lending rates are higher, and shows that it was true also in the inter-war years. In the Report of the Macmillan Committee (para. 70) the rates charged by English banks on advances were given as varying from ½ to 1 per cent. above Bank Rate, with a minimum ranging from 4 to 5 per cent. In comparing this with the Scottish range (1 and 1½ per cent. over) it should be borne in mind that at that time probably a bigger proportion of Scottish advances were overdrafts with interest chargeable only on debit balances. However, the average of the Scottish rates was almost certainly above the English level.

We have no certain information about the advances rates of English banks in the post-war period, but in a recent article in *The Banker*[8] the following rates were given: advances to nationalised industries at Bank Rate; to 'blue-chip' borrowers at ½ per cent. over; to 'good average' borrowers at 1 per cent. over; and to 'marginal borrowers' at 1½ - 2 per cent. over Bank Rate. Apart from the 'marginal' rate (probably exceptional), the level of these rates appear to be about

[7] Referred to, and conceded, by Mr. David Alexander, in the article cited, p. 542.

[8] 'No Epitaph for Freedom', March 1956, p. 133.

the same as that given in the Macmillan Report,[9] though of course one cannot be certain about the average level due to possible shifts of borrowers between the categories (e.g. perhaps fewer enjoying blue-chip status than pre-war). Granted the uncertainty surrounding these figures, there does appear to be a possibility that the gap between Scottish and English lending rates has been wider in recent years than it was pre-war.

A comparison of deposit rates is more straightforward for the post-war period, but the pre-war comparison is complicated by the fact that there were then two English rates—a London rate and a 'country' rate. The country rate was normally a flat 2½ per cent., although it is said that there were attempts to go below this after 1932. The London rate was 2 per cent. below Bank Rate in the twenties, but when Bank Rate was stabilised at 2 per cent. in 1932, this margin narrowed to 1½ per cent.[10] The Scottish deposit receipt rate, at 2 per cent. below Bank Rate with a minimum of 1 per cent., was thus usually the same as the London rate before 1932, but ½ per cent. above it after that date; while it was sometimes above, sometimes below the English country rate (but below it after 1932). Since 1951 the English deposit rate (now a single rate) has been 2 per cent. under Bank Rate, narrowing to 1¾ per cent. when the Rate is 3½ per cent. or under; this means that it is usually ½ per cent. higher than the Scottish deposit receipt rate.[11]

The difference between the levels of English and Scottish bank rates is rather surprising in view of the proximity of the two systems and the presumed mobility of funds between them. In practice the difference may not amount to quite so much as appears. The nationalised industries will clearly not pay more for their loans from Scottish banks than from English banks. But, more than this, it is clear that many firms (e.g. 'blue-chips') that borrow from Scottish banks are in a position to borrow—they may indeed be borrowing—from English banks;[12] as the position of good borrowers vis-à-vis the banks is a strong one, it is unlikely that the Scottish banks can charge them higher rates than those asked in England. But how can this be done

[9] Also the same as that given by Balogh (loc. cit.) which relates to a later period and appears to be based on an independent source.

[10] See 'What Pattern for Money Rates?—1. Agreements and Margins before 1951', *The Banker*, September 1954, pp. 142-3.

[11] The Scottish rate on savings accounts, payable on balances up to a certain maximum (at present £500), is generally higher than the deposit receipt rate when Bank Rate is 4 per cent. or under; above that the two rates are the same. After the stabilisation of Bank Rate at 2 per cent. in mid-1932, the savings account rate was 2½ per cent.

[12] Cf. J. C. Gilbert, 'The Mechanism of Interregional Redistributions of Money', *Review of Economic Studies*, June 1938, p. 189.

consistently with the rate agreements? As we surmised earlier, the answer may lie in the transference of accounts of this kind to the London offices where the Scottish rates do not apply;[13] such firms will get their loans at rates comparable with English rates and they will be paid the English rate for money on deposit. The majority of borrowers from Scottish banks will not have access to English banks and they will have to pay the Scottish rates.[14] We can conclude therefore that the average rates on advances charged by the Scottish banks are higher than the corresponding English rates, but the differences are less than those appearing from the published rates.[15]

The differences between the levels of the various rates in English and Scottish has been put down to the general cost position in Scottish banking.[16] About the consequences for the Scottish economy of persisting difference of this order I doubt if anything useful can be said—in any case various offsetting factors, such as a lower level of fees and charges for other banking services as well as the higher level of general service resulting from a more widespread branch system, would need to be taken into account. But the comparison of rates suggests certain possible weaknesses in the Scottish position which ought to be noticed. There are two other points on which we shall comment here also: one relates to the Scottish interest rates and Bank Rate policy, and the other concerns the part of interest rates in recent profit trends. We shall say something on the first of these right away.

In regard to interest rates the important thing for the authorities in operating policy is that the commercial banks' overdraft and deposit

[13] Mr. Roy Campbell has told me that the dividend warrants of a number of big Scottish companies are drawn on the London offices of Scottish banks; this lends a little weight to the above suggestion.

Another source of leeway on the published rates may lie in short loans; the rate on these is ¼ per cent. under the secured rate, and it sometimes has the statement 'with certain exceptions', in parenthesis, after it. It is, of course, a loan rate and not an overdraft rate, but there is an arrangement for rebates on reductions before maturity.

[14] In the past there may have been some borrowers who could get accommodation from English banks only at certain periods, e.g. when general demand for bank loans was slack, and this may have been a (minor) factor in the tendency for Scottish advances to fall comparatively heavily in slumps.

[15] In the first (1950) edition of J. D. C. Dick's handbook on interest and changes, written when the minimum rate on secured overdrafts was 4 per cent., it was stated (p. 15) that it might be assumed that the average rate on advances at that time was under 4 per cent. If this was correct, it implied that rather a lot of advances were being made at rates below the published minima.

[16] Mr. David Alexander, in the paper already referred to (footnote 1), p. 542, refers to the need of the Scottish banks to earn a higher gross income on assets, due to such factors as a lower scale of fees and charges in Scottish banking, the higher proportion of deposit accounts, and the greater depreciation risk on investment portfolios (because of the higher proportion of investments) requiring larger applications of profits to reserves.

rates should move when Bank Rate changes. Here, as appears from what we have seen earlier, the Scottish banks' practice is quite orthodox. One of the changes in practice, of recent years, has actually introduced an improvement from the policy point of view : the fact that the margins between the overdraft rates and Bank Rate are now kept unaltered when the Rate is very high is a development wholly favourable to the operation of monetary policy. It means that a 7 per cent. Bank Rate brings overdraft rates of the order of 8 and 9 per cent., at which level they can hardly be an insignificant item in business men's costs. This change must tend to increase the effectiveness of Bank Rate policy, and also, incidentally, to reduce the need for bankers to have to curtail advances, when requested to do so, by straight refusals.

As we have already said, the somewhat higher level of bank rates in Scotland may bring certain weaknesses in the Scottish banks' position. The first is on the deposit side. There is today a trend to increasing competition with the banks for deposits on the parts of various financial institutions. As a result of this all banks may experience some loss of deposits. The Scottish banks with their lower deposit rate and their higher proportion of interest bearing deposits within total deposits[17] may be more vulnerable than the English banks to competition from this quarter.

Secondly, there is a possible weakness on the side of advances. The decline in the proportion of advances within the total assets of British banks generally, has brought them to the point where they are always willing to increase the level of these assets when suitable borrowers present themselves.[18] During the post-war period the rate at which they could expand advances has been subject to official control, varying in strictness from time to time. It is unlikely that these restraints on bank lending will be taken off in the foreseeable future, but a point that the Scottish banks should perhaps ponder is the possibility of increased competition in lending from the English banks, should there be any marked relaxation in the policy of control. The higher lending rates of the Scottish banks may lead to some loss of lending business, particularly with medium-sized firms of good credit standing, to English banks anxious and able to expand their loans and advances.

Finally, there remains to discuss the recent reverse in the upward

[17] This is said to be in the region of 40 to 50 per cent.: Alexander, op. cit., p. 541. The Governor of the British Linen Bank has given the proportion for his bank as one half.

[18] Cf. H. G. Johnson, 'Some Implications of the Secular Changes in Bank Assets and Liabilities', *Economic Journal*, September 1951, p. 550.

trend of the profits of Scottish banks, and the part played by interest rates in this. In 1956, in marked contrast with the English position, there was an almost general decline in Scottish banks' profits and the indications so far are that this continued in 1957. The explanation given is this: following the rise in Bank Rate in February 1956, the Scottish banks—for the first time since 1951—raised their lending and their deposit rates by the same percentage; as the amount of their interest bearing deposits exceeds the total of those assets on which the yield varies with Bank Rate (advances, bills and loans to the Discount Market),[19] this rise added more to outgoings than to income. Clearly, besides the interest rate structure, the distribution of assets is involved here, and we shall say something about both factors.

The adverse effects of interest rates on profits in 1956 could have been avoided had the Scottish banks raised the deposit receipt rate by something less than the change in Bank Rate (assuming interest bearing deposits at one half of the total,[20] a difference of 1/5 to 1/4 per cent. would have been enough). That they did not do this seems to show that they do not regard their competitive position as borrowers as strong enough to permit it. Alternatively, they could have raised their overdraft rates by something more than the change in Bank Rate (on the same assumption as before, a difference of 1/3 per cent. would have sufficed). There are some strong arguments relating to the effectiveness of monetary policy, why banks generally should adopt a practice of this kind when Bank Rate is high,[21] but the Scottish banks could not act alone since there is probably a limit to the tolerable difference between Scottish and English overdraft rates.

If present interest rate practices are unalterable then the remedy for profit fluctuations of the kind recently met must be sought in a changed asset structure. The kind of change indicated would be one which brought the amount of variable yield assets up to the level of interest bearing deposits. This would mean replacing a certain quantity of the banks' holdings of gilt-edged, on which the average yield varies only with a considerable lag, with short term assets or advances. But the question to be asked is whether such a change, however much it might eliminate short-run fluctuations, would be in the interests of

[19] Assuming that the proportion of interest bearing deposits was one half, the total of these on the balance sheets of 1956-7 was about £380 m. compared with about £310 m. of variable yield assets.

[20] Judging by the actual change in *declared* profits in 1956 this proportion may be on the high side.

[21] In fact, as we have seen above, the maintenance of the normal margin between overdraft rates and Bank Rate in the present phase of 7 per cent. is a move in this direction.

long-run profitability. Clearly both interests would be served if the increase in variable yield assets occurred as a result of expanding advances, but there is little immediate prospect of this. The effective choice in this matter, at the present time, is between gilt-edged and Money Market assets—Treasury bills or loans to the Market.

Whether or not it would be to the advantage of the banks to substitute, say, Treasury bills for a part of their holdings of gilt-edged depends on the expected future levels of the rate on gilt-edged and the bill rate. If the bill rate is expected to be, on average, above the rate on gilts (or perhaps only below it by a margin which is sufficiently compensated for by the increased liquidity) then a switch into bills is indicated. However, the rate at which such a switch could proceed at the present time would depend on the willingness of the banks to realize losses on gilts which have declined heavily in price since they were bought; and it is probable that this rate is limited to the rate at which present holdings mature, plus any increase in total resources. If, on the other hand, it is expected that the 'long' rate (meaning the rate on gilts of the maturities normally held by the banks) will on average be higher than the short rate, then average long-term profits will be maximised by retaining the present distribution of assets, although the retention of a large proportion of resources in assets with a relatively inflexible yield will cause a greater degree of variability of profits with short-run changes in interest rates. If the general view is right, that the *normal* level of the short rate is below that of the long rate, it would seem that the recent profit reverses of the Scottish banks do not call for any alterations in the long-term distribution of their assets.

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CURRENT TOPICS

The Annual General Meeting of the Scottish Economic Society will be held in the Senate Hall, Old College, South Bridge, Edinburgh, on Monday, 17th March 1958. Tea will be served to members in the Staff Common Room at 4 p.m., and the business meeting will begin at 4.30 p.m. After the formal business, a discussion on Issues of Wages Policy will be introduced by Mr. J. R. Parkinson, Mr. D. J. Robertson and Mr. T. L. Johnston.

All parts of Volume II of the *Scottish Journal of Political Economy* are now out of print and the Society is prepared to re-purchase any or all parts of this volume in good condition at half price. Members are invited to submit spare copies to Oliver & Boyd, Ltd., Tweeddale Court, Edinburgh, 1.

The Business Archives Council, Devereux Buildings, Devereux Court, London, W.C.2, is preparing a survey of the records of British business, whether on deposit with libraries or held by the firms themselves, and is anxious to obtain particulars of such records, particularly from older firms. In addition, a list of century-old firms is being prepared, even if such firms have no records.

The Secretary of the Scottish Economic Society, Mr. T. A. Fraser Noble, has tendered his resignation on his appointment as Secretary of the Carnegie Trust for the Universities of Scotland. Mr. Noble took a leading part in establishing the Society and in launching its *Journal*. He overcame the hesitations of his colleagues by his unwavering confidence in the future of both enterprises, and by his own efforts contributed largely to their success. He brought to the affairs of the Society the shrewdness of an Aberdonian, the selflessness and administrative capacity of an old I.C.S. officer, the zeal and understanding of a teacher, and something extra that comes from a scratch handicap and the power to lick colleagues on the links. His translation from Aberdeen to Edinburgh may remove him from office in the Society but will certainly not put an end to his association with it.

The Council of the Society have invited Mr. T. L. Johnston of the University of Edinburgh to assume the secretaryship, pending the next Annual General Meeting.

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